

TWMA Limited

**Permit Variation Application
Site Report Update
Dales Industrial Estate
Peterhead**

July 2014

Table of Contents

1	Introduction	1
1.1	Site Location	1
1.2	Details of Installation	1
2	Objectives.....	2
3	Land Use History and Site Setting	3
3.1	Environmental Consents Register Surrounding Area	3
3.1.1	Sensitive Land Uses	3
3.2	Historical Land Use Review	3
3.2.1	Historical company records/information	3
3.3	Geological, Hydrogeological and Hydrological Data	4
3.3.1	Geology	4
3.3.2	Hydrogeology and Hydrology	5
3.4	Site Operational Records	6
4	Assessment of Contamination / Pollution Potential	10
4.1	Potentially Polluting Substances and Relevant Activities.....	10
4.2	Preventative Measures and Assessment of Pollution Potential	16
5	Existing Site Investigation and Assessment Reports.....	20
5.1	Original permit application site investigations	20
5.1.1	Grampian Soil Survey Investigation 2005 (GSS 2005).....	20
5.1.2	SLR Limited Investigation 2007 (SLR 2007).....	20
5.2	Cookegan 2014 Review and Site Inspection	20
5.3	Raeburn 2014 Well Installation.	27
6	Site Condition Statement.....	28
6.1	New Land Area	28
6.2	Existing Site Area.....	28
6.3	Baseline Measurements	29

List of Tables

Table 1. Environmental Consents, Licences, Authorisations and Permits
Table 2. Rest Groundwater Levels
Table 3. Recorded Environmental Incidents
Table 4. Hazardous Substances Listing
Table 5. Site Activities with Pollution Potential
Table 6. Site Pollution Prevention Measures
Table 7. Document Review Summary
Table 8. Proposed New Groundwater Monitoring Locations
Table 9. Potential Contaminant Target and Analytical Testing Schedule
Table 10. Soil Sample Analytical Results
Table 11. Groundwater Sample Analytical Results

List of Figures

Figure 1. Site Location and Boundary Plan
Figure 2. Site Drainage Plan
Figure 3. Raeburn 2014 Borehole Locations

Appendices

Appendix A. Borehole Logs
Appendix B. Site Area and Additional Land Photographs - 2014
Appendix C. Drilling and Purging Records - 2014
Appendix D. Laboratory Testing Certificates

1 Introduction

This document represents an update to Site Report information submitted in support of the original (2006) Pollution Prevention and Control (PPC) permit application, made by Total Waste Management Alliance plc, to operate a Part A installation, under the PPC (Scotland) Regulations 2000.

TWMA Limited (TWMA) wish to apply for a substantial variation (additional land area) to the permit that will be considered by the Scottish Environment Protection Agency (SEPA) under the PPC (Scotland) Regulations 2012. As required by these regulations, the update report contains a statement on the initial site condition of the land to be added to the permitted area, including representative baseline data for soil and groundwater quality that updates existing information relating to the site permit area as a whole.

1.1 Site Location

Site Address	Unit 12 Dales Industrial Estate Peterhead AB42 3JF
Grid Reference	NK 110 448
Area (total site)	12,950m ²
Area (new land)	1,582m ²
Local Authority	Aberdeenshire

The site location is shown on Figure 1.

The site is located within Dales Industrial Estate, Peterhead. The site area is about 200m from the main road (A90(T)), with the new area of land adjacent to the southwest corner of the existing site boundary, off Damhead Way.

1.2 Details of Installation

The existing site area is currently a permitted facility for the treatment of Special and non-hazardous wastes generated by the offshore oil & gas industry. The site operates a thermal drill cuttings treatment process, the Rotomill™ that is specifically designed to flash evaporate, retain and reduce the fluid phase present in the drill cuttings, recovering oil and water. The remaining solids phase is discharged as a fine powder.

TWMA propose to continue the existing waste management operations, but to reorganise the site layout and add a new area of land to the site as detailed in the variation application.

2 Objectives

The following outlines the main objectives of this Site Report Update;

- provide information on the physical attributes and environmental setting of the site, including the new land area;
- identify and assess the pollution potential of relevant hazardous materials used on the site; and
- create a point of reference (baseline), against which later determinations may be made as to whether or not deterioration of the site has taken place as a direct result of site operations.

Baseline attributes of the site as it is at present, including the new area of land, are identified using a two stage process, desk study work and intrusive investigations. This is achieved through;

- collection of data relating to proposed site operations, in particular to identify any risks of future releases to land and groundwater;
- review of the site history and the local area using historical maps, diagrams and any other available information;
- assessment of the environmental setting and sensitivity (hydrology, geology, ecology etc) of the site using published public information from The British Geological Survey (BGS), Scottish Natural Heritage and SEPA etc;
- review of any previous site investigations completed to identify any information relevant to the ground conditions and any contamination present;
- completion of a site walkover survey to identify any visual evidence of contamination and allow discussions with staff familiar with the history of the site; and
- completion of new drilling and well installation to allow the collection of representative soil and groundwater samples for contamination testing and comparison against historical data.

3 Land Use History and Site Setting

The following sections detail the sources of desk study information reviewed in order to describe the condition of the site, including the new land area.

3.1 Environmental Consents Register Surrounding Area

A Landmark Envirocheck report relating to the site has previously been submitted to SEPA. The Envirocheck report included reference to a large number of permitted operations in the area. Dales Industrial Estate continues to host a large number of industrial concerns surrounding the TWMA site on all sides. Table 1 provides a summary of local permitted sites listed by the historical Envirocheck report.

Table 1. Environmental Consents, Licences, Authorisations and Permits

Type of Authorisation	Number Recorded by Landmark (2005)
Discharge Consents	32
Integrated Pollution Control (IPC)	1
Registered Radioactive Substances	6
Waste Management Sites	21

3.1.1 Sensitive Land Uses

The site has no potential to impact upon any Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPA) or Special Areas of Conservation (SAC), as there are no such registered sites in the locality (Reference www.snh.org.uk). The site is located in one of the 4 designated Nitrate Vulnerable Zones in Scotland, but these zones relate to agricultural land-use only and do not impact industrial or residential sites.

3.2 Historical Land Use Review

The site land use history has been determined partly through a review of the historical Ordnance Survey maps provided by the Landmark report and by reference to direct site records assembled during the redevelopment of the site by TWMA.

OS maps prior to 1973 show the site to be open agricultural land, with no built development within the site area. The 1990 OS maps show a number of buildings within the existing site boundary, however there is no indication as to the use of these buildings.

The new site area lies outwith any development plot throughout this period and has remained as a section of undisturbed screening belt along the Damhead Way estate access road, largely covered by planted mixed coniferous and deciduous trees.

3.2.1 Historical company records/information

According to information held by TWMA, from the development of the industrial estate, up until 1997, the site was used for light engineering purposes. The contemporary trade directory entry for JJ welding within the Landmark report identifies the site activities as blast cleaning. An environmental survey carried out in October 1997, indicates no evidence of shot blast was found in the area, however the report does not rule out the area may have been used for, or exposed to shot blast contamination.

A plan of the site submitted to SEPA in 1997 outlines proposals to use the site as a transfer/recycling station for the transfer and storage of wastes. The application for the site was submitted in November 1997 and was subsequently approved. The licensed operator of the site at this time was Global Recycling Systems Ltd.

In 1998 Burgess and Garrick Oil Services Ltd submitted an application for an Integrated Pollution Control (IPC) authorisation, which included the location of a drill cuttings thermal treatment plant and associated equipment.

In 1999, a further site plan was submitted to SEPA, outlining proposals to extend the waste transfer and recycling facilities to include the use of existing buildings on the site for storage of special, liquid and recyclable wastes.

In 2000 the waste management licences for the site were transferred from Global Recycling Systems to Total Waste Management Alliance plc.

Since 2000 there have been a number of additional developments at the site; the introduction of a mechanical mixing system for mixing of powder and water; the implementation of oily slops treatment facilities; and the removal of the Fairy Hillock mound (natural materials) from within the main site area.

3.3 Geological, Hydrogeological and Hydrological Data

The geological, hydrogeological and hydrological context for the site has been determined through reference to published geological mapping and surface inspection (existing and new site areas) and the results of site specific investigations (existing site area only).

3.3.1 Geology

Artificial Deposits - There are no artificial deposits, including deposits moved or disturbed by man mapped within a 250m radius of the site. However, it is likely that the development of the Dales Industrial Estate involved a degree of earthworks that is represented by a shallow layer of re-worked clay rich glacial drift that has been identified as Made Ground beneath the majority of the existing site area.

Superficial/Drift Deposits - Maps show superficial deposits beneath the site and the surrounding area comprising glacial till from the most recent Devensian glacial period. Till is dominantly unsorted and unstratified drift and generally unconsolidated (loose), consisting of a heterogeneous mixture of clay, silt, sand and gravel.

Previous site investigations at the site has proven that the drift deposits beneath the site range between 5m and 10m in thickness and contain significant layers of very clayey sediment and water saturated running sands. Individual layers do not appear to persist between investigation locations within the site boundary, indicating significant local heterogeneity within the superficial deposits at a site scale (0-5m vertically and 10-100m laterally).

Bedrock/solid geology - The solid geology of the site and surrounding area is mapped as the Peterhead Pluton, a coarse grained granite rock formation. Granite is generally composed of feldspar, mica and quartz and has a visible crystalline structure. Typically granite bedrock is highly fractured and often exhibits a weathered layer close to the ground surface or interface with recent superficial deposits.

Borehole logs from the most recent site investigations are contained in Appendix A, additional logs from the existing site area are contained in the SLR 2007 report and a detailed description of the sub-surface geology is contained in the GSS 2005 report (see Section 5).

It is considered that there is no significant difference in the basic geology between the existing site area and the new land area.

3.3.2 Hydrogeology and Hydrology

The 1988 1:625,000 Hydrogeological Map of Scotland identifies the site as being in an area with regions underlain by impermeable rocks (referring to the granite bedrock), generally without groundwater except at shallow depths. Intrusive rocks such as this have the potential for some groundwater movement through shallow cracks and joints opened by weathering.

The superficial deposits overlying the granite have been demonstrated to contain significant groundwater by each of the site investigations conducted within the existing site area.

Measurement of rest water levels in surveyed borehole locations appears too variable to allow an estimation of the general groundwater flow direction across the site area. Available groundwater level measurements are shown in Table 2. It would appear that there is no overall hydraulic gradient at the site. Groundwater levels may also be affected by extensive impermeable cover (reducing local infiltration) and installed sub-surface drainage.

Table 2. Groundwater Level Measurements

Location	14BH1	BHS1	BHS2	14BH2	14BH3	BHS3	14BH4
Date	3/7/14	13/11/06	13/11/06	3/7/14	3/7/14	13/11/06	3/7/14
Depth to base (m bgl)	5.41	10.84	9.33	6.35	3.35	9.71	7.55
Rest Water Level (m bgl)	4.77	3.22	3.88	2.63	2.47	3.64	3.62
Ground Level	39.59	39.41	39.70	38.79	38.67	38.98	38.69
RWL Elevation (m AOD)	34.82	36.19	35.82	36.16	36.20	35.34	35.07

Notes: m bgl – metres below ground level; m AOD – metres above Ordnance Datum.

There is a small burn located 400 metres to the south of the site. There are no other surface water features within the locality of the site and all current site surface drainage is directed to the installed artificial drainage system. The site is therefore considered effectively isolated from the local surface water environment.

Hydrogeological and hydrological conditions in the new land area are considered to be the same as those within the existing site.

3.4 Site Operational Records

Environmental incidents, spills and near misses are reported and recorded in accordance with company management system procedures. Records for the site have been reviewed and Table 3 below, outlines the most significant environmental incidents considered to have potential to result in release of contamination to the site sub-surface. All incidents were dealt with promptly through local clean-up and recovery of the released substances. No long term damage or persisting contamination has been reported or recorded.

Table 3. Recorded Environmental Incidents

TWMA Incident Reference	Date	Substance Released	Details
PHD12	28.01.03	Process Powder	Release of powder to surrounding environment
PHD13	28.01.03	Drill Cuttings/Oil Based Mud (OBM)	Mud spilled outwith bunded area causing contamination of soils at site boundary and neighbouring property
PHD27	05.11.03	Diesel	Loss of 200 litres of diesel down drain
PHD31	11.12.03	Oily Slops	Spill impacted outside of bunded area
PHD60	09.07.05	Recovered Oil	Spill from tanker hose during a transfer
PHD65	29.09.05	Oil	Spill from the back door of the tanker
PHD66	08.10.05	Oily Water	Spill from hose during a transfer
PHD72	08.02.06	Diesel	Leak from portable diesel tank
PHD75	08.03.06	Diesel	Overfill of diesel tank during refuelling operation
PHD81	19.05.06	Lab Waste	Leak from container onto floor of special waste store
PHD86	18.09.06	Recovered Oil	Overfill of tank during transfer operation
PHD87	18.09.06	Recovered Oil	Spill from hose during tanker transfer
PHD90	15.12.06	Fluorescein dye contaminated fish waste / oil / sludge	Spill from IBC during mixing operation
TWMA28-07	26.04.07	OBM Cuttings	CST hose damaged resulting in spill
TWMA54-07	26.07.07	Oil	Oil spill during transfer from RD12 to settlement tanks on nightshift
TWMA55-07	30.07.07	Slops	Spill of mud slops resulting in contamination of interceptor and failure fo SW sample
TWMA56-07	26.07.07	Oil	Oil contamination of interceptor
TWMA100-07	18.12.07	Slops	Spill of oily slops during transfer from boiler 1 to screening box
TWMA06-08	17.01.08	Recovered Oil	Spill of recovered oil from settlement tank
TWMA08-08	09.01.08	Oily Substance	Scottish Water were on site to take their weekly routine sample of the surface and foul water drainage system when they noticed a skim of an oily substance
TWMA14-08	15.02.08	Oil	Overfill of tanker resulting on oil escaping out of the top hatch
TWMA27-08	29.03.08	Slops	Overfill of tank resulting in a spill onto the ground
TWMA62-08	24.07.08	Slops	Valve left open when transferring into slops storage containers resulting in spillage
TWMA63-08	25.07.08	Oil	Tanker lost suction and when connection was broken oil was released
TWMA65-08	01.08.08	Slops	Site glass on tanker ruptured resulting in

TWMA Limited Site Report Update – July 2014

TWMA Incident Reference	Date	Substance Released	Details
			loss of slops
TWMA79-08	26.09.08	Oil	Slops plant container leaking oil
TWMA84-08	13.11.08	Slops	Hose burst during a tanker transfer
TWMA91-08	03.12.08	Slops	Centrifuge filter box overflowed due to valve not being opened
TWMA18-09	02.03.09	Recovered Powder	Dust bag burst
TWMA20-09	27.02.09	OBM Cuttings	Part of feed line burst when filling hopper
TWMA24-09	28.03.09	Slops	Spillage of slops from filter box due to operation being performed with valve open
TWMA31-09	03.04.09	Recovered Water	Odour source from leaking joint on recovered water line form RD26 to tank 17 (recovered water tank)
TWMA51-09	17.07.09	Recovered Powder	When filling bulk bags wrong bag type used and bag burst resulting in loss of powder
TWMA54-09	23.07.09	Oil	Oil observed in surface water interceptor
TWMA71-09	13.10.09	Transformer Oil	Potential leak noticed next to the transformer on the northern site boundary - TWMA notified the energy company. Energy company advise they will deal with this. TWMA NOT RESPONSIBLE
TWMA72-09	19.10.09	Recovered Water	Recovered water from Tank 16 flooded the area around the mobile units
TWMA76-09	27.10.09	Oil	Oil flowing from the overflow pipe on the inside oil tank (RD12)
TWMA80-09	03.11.09	OBM Cuttings	Spill of cuttings out the back of the cement mixer as it was manouvered over a ramp
TWMA82-09	10.11.09	Recovered Powder	A full dust bag burst (bottom fell off) when being moved resulting in a localised spill of powder at the back of RD12
TWMA85-09	23.11.09	Oil	Oil spill from RD18 oil condenser tank
TWMA88-09	10.11.09	OBM Cuttings	Overfilled bin with oil-based mud
TWMA89-09	30.11.09	Slops	Spill during tanker transfer
TWMA91-09	08.12.09	Recovered Powder	Dust bag fell of trailer and spilled on the floor
TWMA92-09	08.12.09	Recovered Powder	Dust bag burst
TWMA94-09	08.12.09	Recovered Powder	Dust bag burst when being lifted over the ramp
TWMA95-09	08.12.09	Recovered Powder	Dust bag burst when lifted
TWMA97-09	10.12.09	Recovered Powder	Two dust bags burst, due to bottom falling off
TWMA03-10	15.01.10	Recovered Powder	Burst bag containing dust from powder silos
TWMA04-10	20.01.10	Antifreeze / Water Mix	Accidental release of antifreeze / water mix into bund following clipping of valve

TWMA Limited Site Report Update – July 2014

TWMA Incident Reference	Date	Substance Released	Details
TWMA05-10	25.01.10	Recovered Powder	Burst bag containing dust from powder silos
TWMA07-10	28.01.10	Slops	Hose disconnected whilst pumping from tanker to tank 5B
TWMA10-10	04.02.10	Dirty Wash Water	Dirty water being pumped to surface water drain
TWMA11-10	11.02.10	Recovered Oil	3rd party tanker door not closed when loading resulting in spill
TWMA12-10	11.02.10	Recovered Powder	High temperatures resulting in burst dust bags
TWMA13-10	12.02.10	Slops	Spill from centrifuge area
TWMA37-10	11.10.10	Oil	Oil sheen noted on Fairy Hillock
TWMA50-10	10.12.10	Recovered Powder	Mill burst disc ruptured leading to the release of approx. 200kg of powder into bunded area
2011-08	12.05.11	Oil	Oil leak from breather engine caused spill in the yard
2011-22	28.07.11	Dirty Water	Tanker spill to foul water drain resulted in severe exceedance of discharge consent
2011-42	10.10.11	Slops	Slops spilled into the yard at the side of tank 21
2012-15	23.02.12	OBM Cuttings	Spill of drill cuttings from the cuttings skip onto the weighbridge and the surrounding area
2012-21	11.03.12	Recovered Oil	Escape of recovered oil from a hose spraying into Talisman yard
2012-26	01.04.12	Slops	Tank overfilled through carbon bed spraying slops into Talisman yard
2012-59	17.09.12	Slops	Improper placement of equipment caused pump failure, leading to small spill within bunded area
2013-57	05.09.13	Oil	Engine powering RD14 leaked oil into the sump, and onto the site surface within the bunded area. Approximately 240 litres of oil was released. No liquid entered the site drains
2013-63	17.09.13	Slops	Slops Spill on Peterhead Yard caused by bin being pulled from truck
2013-81	26.10.13	Foul Water	Restrictor valve blockage caused backflow of foul water into Peterhead main yard, which may have entered surface water interceptor
5	20.01.14	Diesel	Overfill of tank during a refuelling operation resulting in the loss of approximately 30 litres
9	28.01.14	Diesel	Overfill of tank during a refuelling operation
29	20.04.14	Slops	Slops tank at back of RotoMill overflowing spilling into the bund
45	13.06.14	Crude Sludge	Spill during tanker transfer

Records of these incidents and associated mitigation actions are held on-site.

4 Assessment of Contamination / Pollution Potential

4.1 Potentially Polluting Substances and Relevant Activities

A listing of all hazardous substances used, stored, manufactured (or waste by-products from the manufacturing process) is contained in Table 4. An assessment of their pollution potential has been made based upon their properties, toxicity and volume stored. With reference to polluting substances which may already be in the soil and groundwater beneath the site area, these are largely the same as those referenced in Table 4, since the site has been used for essentially the same purposes since 1997. Pre-1997 the site was used for light engineering purposes, therefore possible contaminants include hydrocarbons from oil or fuel spills (difficult to distinguish from those originating from current operations). There may also be zinc, xylene, toluene, and/or methyl ethyl ketone etc contamination from paints used in painting and maintenance operations (again, likely to be very similar in nature to contamination potentially arising from current operations).

Table 4. Hazardous Substances Listing

TWMA COSHH Assessment No.	COSHH Index Name	Assumed Use / Hazardous material content	Testing / detection proposal	Comment
0436	RECOVERED POWDER	Bulk waste product, contains oil, mud and salt residues.	TPH characterisation by GC FID and SVOC screen by GCMS Ba by ICP, chloride by ion chromatography.	Main bulk product stored on site. Shares similar contaminant profile to incoming cuttings / slops etc.
0437	DELTAPLEX 2EP LITHIUM GREASE	Solid grease product. No significant hazards.	None required	Trivial usage. No obvious route to sub-surface.
0440	TTCE	Assume is tetrachloroethene degreaser / cleaner.	VOC screen by GCMS	
0441	HYDROCHLORIC ACID 32%	Strong acid solution.	pH testing	Free acid unlikely to persist in sub-surface
0452	CAT ELC COOLANT	Engine coolant solution containing glycol based anti-freeze.	None required	Anti-freeze and additives likely biodegradable at low concentrations
0455	HEMPATEX ENAMEL 5360 YELLOW	Aerosol / small volume containers specialist paint.	None required	Trivial usage. No obvious route to sub-surface.
0465	TYGRIS R260 HEAVY DUTY ADHESIVE	Water insoluble adhesive. V small volumes in use.	None required	Trivial usage. No obvious route to sub-surface.
0509	FLORISIL	Inert powder.	None required	Trivial usage. No obvious route to sub-surface.
0519	SIGMAFAST HS ENAMEL	Aerosol / small volume containers specialist paint.	None required	Trivial usage. No obvious route to sub-surface.
0583	SODIUM CHLORIDE	Salt.	Chloride testing by ion chromatography	Likely insignificant compared to chloride contained in powder and incoming wastes.
0882	DECON 90	Detergent.	None required	Trivial usage. No obvious route to sub-surface.

TWMA Limited Site Report Update – July 2014

TWMA COSHH Assessment No.	COSHH Index Name	Assumed Use / Hazardous material content	Testing / detection proposal	Comment
1088	VALVOLINE MAVLIFE COOLANT 50/50	Engine coolant solution containing glycol based anti-freeze.	None required	Anti-freeze and additives likely biodegradable at low concentrations
1136	B&Q EXPANDING FOAM	Aerosol foam.	None required	Trivial usage. No obvious route to sub-surface.
1138	FAIRLINE SCREEN WASH	Aqueous vehicle screenwash.	None required	Trivial usage. No obvious route to sub-surface.
1139	HEMPATEX HI BUILD 46410	Solvent based paint. Zinc phosphate content.	Xylene and ethyl benzene by VOC screen (GCMS) / Zinc by ICP-OES	Also contains methacrylates
1140	NEOPAINT NPT16 AEROSOL	Aerosol paint.	None required	Trivial usage. No obvious route to sub-surface.
1142	BLUE STAR DEICER AEROSOL	Alcohol based deicer.	None required	Trivial usage. No obvious route to sub-surface.
1145	AIC MOTORWAY PLUS	Aerosol / small volume containers specialist paint.	None required	Trivial usage. No obvious route to sub-surface.
1160	MCI 2NF H2S BACTOCIDE & SCAVANGER	H2S scavenger added to process. No info on composition available, very low volume use.	None required	Trivial usage. No obvious route to sub-surface.
1143	R306 GLOSS WHITE PAINT RAL9003	Aerosol / small volume containers specialist paint.	None required	Trivial usage. No obvious route to sub-surface.
1208	BROSTE PIONEER DEICING SALT	Salt.	Chloride testing by ion chromatography	Likely insignificant compared to chloride contained in powder and incoming wastes.
1216	LCL400 COD	Chemical test kit components.	None required	Trivial usage. No obvious route to sub-surface.
1217	LCK014 COD	Chemical test kit components.	None required	Trivial usage. No obvious route to sub-surface.

TWMA Limited Site Report Update – July 2014

TWMA COSHH Assessment No.	COSHH Index Name	Assumed Use / Hazardous material content	Testing / detection proposal	Comment
1218	LCK914 COD	Chemical test kit components.	None required	Trivial usage. No obvious route to sub-surface.
1219	LCK311 CHLORIDE	Chemical test kit components.	None required	Trivial usage. No obvious route to sub-surface.
1222	COOGAR GAS	Welding gas.	None required	Gaseous components not a risk to sub-surface
1223	SIGMAFAST 20	Solvent based paint.	Xylene and ethyl benzene by VOC screen (GCMS) / Zinc by ICP-OES	
1224	ACETYLENE	Cutting torch gas.	None required	Gaseous components not a risk to sub-surface
1225	COMMA COPPER EASE	Solid grease product. No significant hazards.	None required	Trivial usage. No obvious route to sub-surface.
1226	TG805&TG8212 COPPER ANTI SEIZE	Solid grease product. No significant hazards.	None required	Trivial usage. No obvious route to sub-surface.
1230	NITOFLO LITHURIN	Fluorosilicate concrete / floor treatment	pH testing, fluoride by ion chromatography.	Limited release to sub-surface likely during normal use.
1272	ACC SILICONE SGM494	Low hazard silicone grease.	None required	Trivial usage. No obvious route to sub-surface.
1274	BC 152 BOILER CLEANER	Anti-corrosion additive, very low volume usage.	None required	Trivial usage. No obvious route to sub-surface.
1275	TIGERSEAL	Low volume adhesive / sealant	None required	Trivial usage. No obvious route to sub-surface.
1276	HYCOTE GLOSS WHITE UK032	Solvent based paint.	Xylene and ethyl benzene by VOC screen (GCMS) / Zinc by ICP-OES	
1277	WD 40 NON AEROSOL	Highly volatile, petroleum based freeing agent.	None required	Trivial usage. No obvious route to sub-surface.

TWMA Limited Site Report Update – July 2014

TWMA COSHH Assessment No.	COSHH Index Name	Assumed Use / Hazardous material content	Testing / detection proposal	Comment
1316	SILEXA ACTIVE CARBON	Activated granular carbon. Low hazard solid.	None required	No identified hazard to sub-surface.
1333	RUBIA 4400 15W40 (Total)	Engine oil	Oil components by TPH characterisation (GC FID).	Very low mobility in sub-surface.
1334	ULTRMAX HLP 46 HYDRAULIC OIL	Hydraulic oil	Oil components by TPH characterisation (GC FID).	Very low mobility in sub-surface.
1335	VALVOLINE SAE 30	Engine oil	Oil components by TPH characterisation (GC FID).	Very low mobility in sub-surface.
1336	RUBIA S30 (TOTAL)	Engine oil	Oil components by TPH characterisation (GC FID).	Very low mobility in sub-surface.
1337	CAPRANO TDH 15W40	Engine oil	Oil components by TPH characterisation (GC FID).	Very low mobility in sub-surface.
	Polygold C328	Water treatment flocculant. Likely present in drainage.	COD / TOC testing would detect excess organics release from drainage or spills / leaks. Ammonia for amide breakdown products.	Polyacrylamide polymer (non-toxic) with adipic acid added.
	Diesel Fuel	Site plant fuel	TPH characterisation will identify diesel component.	
	Incoming waste stream	Mixture of cuttings, mud and other drilling residues and brine.	Oil components by TPH, other organic residues by SVOC scan. Drilling mud typically contains barium sulphate. Brine content will dictate chloride levels.	

Table 5, provides a summary assessment of the pollution potential associated with routine site operations (current and proposed). Table 5 is used in conjunction with Table 4, to formulate a testing suite for any future sampling and testing of soil and groundwater at the site (including the latest site investigations reported later in this document).

Table 5. Site Activities with Pollution Potential

Potentially Polluting Substance	Relevant Activity	Reason
Drill cuttings and slops	Receipt of bins and unloading from road transport.	Spillage on installation roads possible entering road drainage system, spillage during offloading and weigh in.
	Storage in bins and bulk tanks.	Spillage during storage in bins and spillage during transfer to bulk storage tanks via grab crane. Failure of containment systems.
	Transfer by pumping and mechanical grab.	Spillage due to pump failure. Spillage during movement across the yard via concrete mixer. Failure of feed hopper resulting in spillage.
Diesel fuel	Off-loading	Spillage during transfer from road tanker to dedicated site storage tanks.
	Storage	Failure of containment systems resulting in loss of diesel to environment.
	Transfer to engine/generator	Failure of fuel valves/fuel lines during transfer.
Recovered oil	Transfer to bulk storage	Failure of electric pump and hard lines or failure of vacuum tanker.
	Storage	Failure of containment systems.
	Transfer off site	Spillage during transfer to bulk tanker. Spillage from road tanker on installation roads entering road drainage system.
Recovered powder	Transfer to bulk storage	Failure of blow lines and air blower resulting in release of powder
	Mixing	Failure of mixing equipment resulting in release
	Storage of mixed powder	Failure of container resulting in release of powder
	Removal offsite	Failure of transport container resulting in loss of powder on installation roads and possibly entering road drainage
Recovered water	Transfer to bulk storage	Failure of containment systems resulting in release of waste water.
Maintenance chemicals	Storage	Failure of containment systems resulting in release of chemicals.

4.2 Preventative Measures and Assessment of Pollution Potential

In light of the pollution potential illustrated above, the site has operated (and continues to operate) under extensive pollution prevention measures and procedures (physical infrastructure and those relating to testing, inspection and maintenance) for each relevant activity associated with the potentially polluting substances as identified in Table 6.

Table 6. Site Pollution Prevention Measures

Relevant Activity	Primary Containment	Secondary Containment	Tertiary Containment
Drill Cuttings and Slops			
Drill cuttings and slops receipt and storage	Cuttings bins compliant to British standards and LOLER regulations. All bins used in transport of drill cuttings and slops are certified and tested. Slings and shackles are tested every 6 months.	Under normal operating conditions drill cuttings bins are stored on an area of impermeable hardstanding. The area is not bunded and has no containment kerb as this would prevent forklift access.	Oil interceptor and shut off key which can be shut off in event of any spillage to prevent cuttings entering drainage. Interceptor is inspected on a daily basis as part of daily site inspection. Also all staff trained in documented spill procedure on 6 monthly basis.
Drill cuttings and slops transfer	Pump itself provides primary containment . Prevention against blocking provided by regular purging of line, pressure testing and automatic shutdown feature in event of blockage.	Pump lines are mounted on bund walls and protected by armco crash barriers.	Oil interceptor and shut off key which can be shut off in event of any spillage to prevent cuttings entering drainage. Interceptor is inspected on a daily basis as part of daily site inspection. Also all staff trained in documented spill procedure on 6 monthly basis.
Diesel / Gas Oil			

Relevant Activity	Primary Containment	Secondary Containment	Tertiary Containment
Fuel oil delivery	Road tanker	Road tanker is located on area of impermeable hard standing during transfer. All fuel storage transfer tanks are located within concrete bunded areas	During deliveries of fuel oil all drains are covered with spill protection drain cover mats. Fuel transfer is operated under a permit to work system. Specialised transfer lines/valves with automatic shut off mechanism are used during transfer. Oil interceptor and shut off key which can be shut off in event of any spillage to prevent diesel entering drainage. Interceptor is inspected on a daily basis as part of daily site inspection. Also all staff trained in documented spill procedure on 6 monthly basis.
Fuel oil storage	Above ground steel tank. Daily visual inspection for leaks or signs of excessive corrosion / damage.	All storage tanks are contained within concrete bunded areas. Bunds are inspected on a daily basis as part of the daily site inspection.	Oil interceptor and shut off key which can be shut off in event of any spillage to prevent diesel entering drainage. All staff trained in documented spill procedure on 6 monthly basis.
Transfer to generator/engine	Pumping/fuel lines. Prevention against blocking provided by regular purging of line and/or pressure testing.	Engines/generator are contained on area of impermeable hardstanding and totally enclosed within plant building and within bunded areas.	During fuel transfer drain cover mats are placed over drains. Fuel transfer is covered by permit to work system. Oil interceptor and shut off key which can be shut off in event of any spillage to prevent diesel entering drainage. All staff trained in documented spill procedure on 6 monthly basis.
Recovered Oil			
Transfer to bulk storage	Permanent pump line. Prevention against blocking provided by regular purging of line and planned maintenance schedule.	Armco crash barriers protect any exposed pump lines. Pumping takes place on areas of impermeable hardstanding.	Oil interceptor and shut off key which can be shut off in event of any spillage to prevent oil entering drainage. Also all staff trained in documented spill procedure on 6 monthly basis.

TWMA Limited Site Report Update – July 2014

Relevant Activity	Primary Containment	Secondary Containment	Tertiary Containment
Storage	Above ground tanks. Tanks are inspected daily during tank volume measurement.	All recovered oil storage tanks contained within concrete or corrugated metal/steel bunded areas. Bunds are inspected on a daily basis as part of daily site inspection.	Oil interceptor and shut off key which can be shut off in event of any spillage to prevent oil entering drainage. Interceptor is checked on a daily basis as part of site daily inspection. Also all staff trained in documented spill procedure on 6 monthly basis.
Transfer off site	Pump line/tanker.	Tanker loading takes place on area of impermeable hardstanding.	Transfer of recovered oil to tanker supervised by site personnel. Drain cover mats placed over drains during transfer. Oil interceptor and shut off key which can be shut off in event of any spillage to prevent oil entering drainage. Also all staff trained in documented spill procedure on 6 monthly basis.
Recovered Powder			
Transfer to bulk storage	4" Steel Blow line.	None required for a solid product.	Safety valve pressure controllers fitted to blow line to regulate pressure. All pipework is inspected on daily basis and all staff are trained in spill response procedures.
Storage	50 tonne storage silos.	None required for a solid product.	Safety valve pressure controllers fitted to silo's to regulate pressure. Staff trained in spill response procedures.
Mixing	Weighbell, flexible pipe and impellor mixer enclosed within steel box.	None required for a solid product.	Emergency stop and automatic shut down mechanisms. All staff are trained in spill response procedures.
Removal offsite	Transport containers.	None required for a solid product.	ADR drivers trained in correct procedure for spillage incidents on public highways.
Recovered water			
Storage	Above ground storage tank(s).	All storage tanks are held within bunded areas which are inspected on a daily basis as part of site daily checks.	All staff trained in spill response procedures. Water is discharged off-site via authorised Scottish Water discharge consent.
Maintenance Chemicals			

Relevant Activity	Primary Containment	Secondary Containment	Tertiary Containment
Storage	Supplied in drum/container.	All chemicals for use on site are stored in a segregated area in enclosed building.	Interceptor shut off to prevent any spillage escaping site. Drain cover mats for surface water drains to prevent any spillages entering surface water drainage system. All staff trained in appropriate spill response action.

With regard to subsurface structures not subject to daily inspection, the site drainage plan outlines the routing and fate of all installation drains (discharge to the Scottish Water foul drain via a single consented discharge). A copy of this plan is provided as Figure 2. There are no subsurface storage vessels / tanks located at the installation.

Impervious surfaces of the yard are inspected as part of the daily site inspection. There is no planned maintenance schedule for impervious surfaces, however any defects in hard standing of the site are reported and repaired in accordance with the appropriate management system procedure. All operational areas of the yard are now provided with impervious concrete surfacing (although this was not always the case for the cuttings offloading area). The drill cuttings bin storage area is not bunded or surrounded by a containment kerb as a bund would prevent forklift access. As previously stated the bins are manufactured and tested in accordance with British Standards and are designed to survive severe offshore working and sea transport conditions, so accidental release of contents in the off-loading area is unlikely.

All major storage tanks on the site are provided with bunding, calculated to be 110% the capacity of the largest tank in each case. Bunds are inspected as part of the daily site checks. All storage tanks are checked regularly and tank volumes are measured by using a dip tape. Any sump contained within a bunded area is a blind collection point and is not connected to site drainage system.

The site is operated under an externally certified management system which is certified to ISO 4001; ISO 9001 and OHSAS 18001 standards. The system is a 3 tier system which details procedures, work instructions and forms. Within the management system, there are a number of procedures/work instruction detailing inspection and maintenance of the site and the associated equipment. The EMS also contains spill and fire emergency procedures which are practiced every 6 months. Management procedure training, awareness and competence is assessed for all site personnel and details of all training received are recorded on each individual's training record, which is held by Human Resources.

5 Existing Site Investigation and Assessment Reports

As previously mentioned in this report, an environmental survey of the site was conducted in October 1997, to identify the status and condition of the yard at the time and identify possible historical contamination points and other environmental concerns. Six trial pits were excavated and representative samples were collected and analysed from each. The report concluded that the area in question exhibited nickel, zinc and cyanide contamination, although subsequent assessment of the data has discounted this assessment, due to all the referenced nickel and cyanide data actually being below the quoted laboratory detection limits (for the laboratory being used at the time). All detected contamination was at concentrations below the action limits pertaining at the time.

The site is also subjected to internal environmental audits on a regular basis, with the results being recorded and held at the site. A number of observations from historical audits relate to possible uncontrolled releases to land / groundwater:

- Spillages of drill cuttings and process residues. The areas on which these materials were released is generally concreted, minimising the potential for migration of contaminants into underlying soil and groundwater.
- Use of unsurfaced areas of the site for operations, any spills or leaks in these areas could result in contamination migrating into underlying soil and groundwater.

5.1 Original permit application site investigations

5.1.1 Grampian Soil Survey Investigation 2005 (GSS 2005)

Grampian Soil Survey carried out a soil and groundwater investigation covering the whole of the existing site area, including an area of aggregate hardstanding that was used for drill cuttings unloading and transfer at the time. Basic site layout and operations were similar to current at that time. The report is held by SEPA as a record of site conditions at permit application.

5.1.2 SLR Limited Investigation 2007 (SLR 2007)

SLR Limited carried out a follow-up investigation to the GSS 2005 work, resulting in the conclusion that no active remediation of soil or groundwater was required. SLR recommended the completion of concrete / impermeable cover for all operational areas of the existing site to prevent future releases of pollutants to the site sub-surface.

5.2 Cookegan 2014 Review and Site Inspection

A summary of relevant information gathered from a review of the previous investigation reports (and the recent drain inspection report) is provided in Table 7.

Table 7. Available Documentation Listing and Comments

Date	Document Identification	Content and Comment
Undated	Process Information	Unattributed text providing an overview of the main cuttings treatment process. Frictional grinding used to drive off water and oil, which are condensed separately and collected for re-use (oil) and discharge (water). Powdered solid residues are collected for off-site disposal. Water is filtered and monitored for contamination prior to discharge into site drainage. The note provides some information on the chemical composition of typical cuttings / drilling mud mixtures being treated at the site.
02/03/05 (as recorded in MS Word document properties)	TWMA plc, Application Site Report, Dales Industrial Estate, Peterhead.	TWMA prepared Site Report document, including background to the objectives of the Site Report and the site activities covered by the PPC application. Reference to Envirocheck registers and historical mapping. Details of previous landuse and a number of spill incidents on the site (2003-2004). Reference to previous site investigation at the time of first occupation of the site (in its current form), with contamination of soils by nickel, zinc and cyanide, although no remedial action was specified at the time. Reports on potential contaminative activities and pathways observed during site audit inspections and references detailed listings of potentially polluting substances / activities present on site. Some appendices missing from MS Word document and reference to LDG-GSS survey (results awaited). Assumed not submitted to SEPA?
31/03/05	LandDrill Geotechnics – Grampian Soil Surveys, Site Investigation Report, Issue 1 (Contract Ref: 11299/05).	Site investigation report, with risk assessment and mitigation actions included. Includes summary of site land use history up to 2005 and a preliminary Conceptual Site Model (CSM) identifying potential contamination sources, pathways and receptors for the site. A total of 9 boreholes were sunk across the whole site area, targeted at potential contamination entry points based on the CSM. Testing conducted for a general list of Contaminants of Potential Concern (CoPC). Elevated zinc and total petroleum hydrocarbons (TPH) reported, along with high and low pH soil conditions. No delineation of source zones attempted. Risk mitigation in the form of surface sealing (by concrete) and groundwater treatment recommended.
Undated	Remediation Statement.	Unattributed text references LDG-GSS report. States that TPH in soil is the only CoPC requiring remedial action (by excavation and removal). Zinc and ammonia (in groundwater) contamination not attributed to site activities. Recommends additional concrete surfacing, drainage improvements and monitoring. Recognises requirement to return site to baseline conditions on closure. Estimates work to be undertaken in 2006, but no verification / records now available.

TWMA Limited Site Report Update – July 2014

Table 7. Available Documentation Listing and Comments

Date	Document Identification	Content and Comment
January 2007	SLR Limited, Site Investigation and Risk Assessment Report (SLR Ref: 405-1244-00001).	Additional site investigation and subsequent risk assessment to determine if significant contamination existed in the sub-surface soil and groundwater, following-on from the LDG-GSS report. A new CSM was prepared and a preliminary risk assessment conducted on linkages identified within the new CSM. Additional groundwater monitoring wells (3No.) were installed in response to SEPA "recommendations" (no details provided). Wells were positioned so as to be upgradient (background); downgradient; and adjacent to; the previously identified contaminated soil location. One round of groundwater sampling and analysis was conducted. No soil sampling or testing is reported. Contamination levels (particularly TPH, ammonia and PAH) are generally lower than reported by the LDG-GSS. Risk assessment of the contamination levels found in soil and groundwater samples suggested that no remediation was required, although additional sealing of the site surface was recommended.
May 2010	Granite City Surveys Ltd, Existing Site Survey Layout Plan. Dwg No. GCS3256 T-01	Topographic survey locations on site layout.
31/03/11 26/01/11	Site Layout and Vent ID Plan Site Layout and Tank References Dwg No. PHD-LY-00-00-3108 Rev01 and PHD-LY-00-00-3051	Site layout plans indicating location of major storage tanks, buildings, manholes and ground cover.
01/11/12	Drainflow (Aberdeen) Ltd, 091-12 TWMA Peterhead	Drain survey report, records drain features and identifies a number of significant defects and some sedimentation.
April 2014	TWMA Peterhead Proposed Site Layout	Draft indicative layout for site, including new clean cuttings bin storage area, relocated tankage and main drainage routes.

In addition to the document review, a site walkover was conducted in order to provide a context for the review and to discuss the proposed changes to the site operations / development layout. Photographs were taken, illustrative of the existing site surface conditions, both within the operational areas and across the newly cleared area that is to be added to the PPC boundary as part of the variation application. Photographs are presented in Appendix B.

Site personnel confirmed that the new development area had been essentially undisturbed since the development of the Dales Industrial Estate and that the soil profile revealed by recent tree clearance was most likely to be the original ground surface. It is noted that ground levels in this part of the site are likely to be significantly lowered and levelled on completion of the new development (an open storage area for clean containers / skips etc).

While the majority of the active operational site area is covered by concrete, it was noted that the condition of the concrete (and associated joints / slab edges) was variable and that containment bunding along the edges of concrete areas was not universally effective (oily contamination was observed at one location, leaking into un-sealed ground close to the cuttings treatment plant). The integrity of the site drainage system is also reported to be compromised in places, with further leakages to the sub-surface likely to be occurring along those routes also. It is noted that drainage repairs and follow-up surveying were imminent at the time of writing. Follow-up drain survey reports will be made available by the site management on completion.

Bulk storage containment appeared in sound condition, with all large tanks and containers in bunded areas. It is noted that the raw cuttings material and associated liquids do not generally contain visible free oils and spills or leaks from these materials are likely of lower contamination potential than the liquids and recovered oils arising in the process and recovered product storage areas.

Previous site investigation locations provide site wide coverage, apart from the proposed new development area to the southwest of the site. However, it has subsequently been confirmed by the site that none of the previously installed monitoring wells or boreholes remain open / available for future use. Consequently, the need for new boreholes and soil and groundwater sampling was agreed.

The rationale for well location and sample testing suites (based on the hazardous materials assessment discussed above) were agreed with SEPA in advance of drilling and sampling. Table 8 provides the rationale for well locations and Table 9 provides the justification for the agreed analytical targets.

Table 8. Proposed New Groundwater Monitoring Locations

Location ID	Well Depth and Installation Detail	Justification Statement
14BH01	Target of 9m below ground level (4m below likely resting water level (RWL)). 50mm diameter slotted wellscreen with a clean pea gravel pack. Upper 3m solid casing and bentonite pellet seal to prevent surface water infiltration.	Likely up hydraulic gradient of any potentially contaminative site operations. Represents local background conditions. Adjacent to large cuttings storage tanks. Previous investigations just to the northeast (down gradient) detected low pH and zinc contamination in soil samples extending to in excess of 4.5m depth , with oil contamination in groundwater (Grampian Soil Surveys, 2005).
14BH02	Target of 9m below ground level (4m below likely RWL). 50mm diameter slotted wellscreen with a clean pea gravel pack. Upper 3m solid casing and bentonite pellet seal to prevent surface water infiltration.	Central processing area of site. Adjacent to, and just down gradient of the main cuttings treatment plant. Previous investigations found zinc contamination in soil samples extending to in excess of 6m depth , with oil and ammonia contamination in groundwater samples (zinc not detected) (Grampian Soil Surveys, 2005).
14BH03	Target of 9m below ground level (4m below likely RWL). 50mm diameter slotted wellscreen with a clean pea gravel pack. Upper 3m solid casing and bentonite pellet seal to prevent surface water infiltration.	Central storage area of site, down gradient of material reception area drainage catchpit and main foul sewer line. Directly adjacent to large storage tanks. Previous investigations found oil contamination in shallow soils in the vicinity (Grampian Soil Surveys, 2005).
14BH04	Target of 9m below ground level (4m below likely RWL). 50mm diameter slotted wellscreen with a clean pea gravel pack. Upper 3m solid casing and bentonite pellet seal to prevent surface water infiltration.	Down gradient boundary of the site. Adjacent to large storage tanks, down gradient of other storage tank area and main foul drain line. Previous investigations detected low pH and zinc contamination in soil samples the vicinity, with oil and ammonia contamination in groundwater samples (Grampian Soil Surveys, 2005).

Table 9. Potential Contaminant Target and Analytical Testing Schedule

CoPC ID	Reason for inclusion	Analytical Methodology	Typical Detection Limit
Petroleum hydrocarbons.	Principal component of drill cuttings and waste drilling mud materials stored, transferred and treated at the site. Also present as stored diesel fuel and recovered oil in bulk storage tanks.	TPHCWG TPH Banded Split. Bespoke methodology originally produced for the American TPH Criteria Working Group (TPHCWG). Gas Chromatograph (GC) separation of components with Flame Ionisation Detection (FID). Reported as contaminant mass per mass or volume of sample, split into carbon chain (aliphatic) and carbon ring (aromatic) components within different molecular mass bands.	10mg/kg (soil) 10ug/l (water)
Toxic metals.	Common contaminants of drilling mud (barium) and other process chemicals brought to / used at the site and those associated with previous site uses (zinc, chromium).	Acid extraction of metallic contaminants (soils) followed by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) or similar.	10 – 0.1mg/kg (soil) 10 – 0.1ug/l (water)
Semi-volatile Organic Compounds (SVOC).	Common trace contaminants contained in oil and solvent based wastes / materials used on site (including PAH, glycol and amines).	Solvent extraction followed by GC separation of components and identification by Mass Spectrometry (GCMS). Examination of chromatograms to confirm absence of unidentified / unexpected compounds.	1 – 0.1mg/kg (soil) 0.1 – 0.01ug/l (water)
Volatile Organic Compounds (VOC).	Components of solvents used in paints and recovered oils stored on site.	Direct GCMS of sample headspace.	1 – 0.1mg/kg (soil) 0.1 – 0.01ug/l (water)
Chemical Oxygen Demand.	Indicator of contamination by sewage or other organic rich compounds (including oils).	Wet chemical analysis measuring amount of chemical oxidant consumed by sample. Water samples only.	10mg/l (water)
Sulphate.	Component of drilling muds processed on site.	Acid extraction of sulphate (soils) followed by Ion Chromatographic separation and electrical conductivity detection (Dionex or similar).	10mg/kg (soil) 1mg/l (water)

Table 9. Potential Contaminant Target and Analytical Testing Schedule

CoPC ID	Reason for inclusion	Analytical Methodology	Typical Detection Limit
Ammonia.	Typical contaminant found in sewage and due to the breakdown of nitrogen containing organic compounds contained within site waste / process materials.	UV spectrometry. Water samples only (not significantly retained in soils).	0.1mg/l (water)
Asbestos fibres.	Typical contaminant found in building materials / industrial process plant.	Visual inspection using optical microscopy. Soils only (not typically mobile in groundwater).	<0.001% by mass.
Chloride.	High levels found in seawater / brine liquids imported onto site.	Ion chromatography (as per sulphate). Water samples only (not significantly retained in soils).	10mg/l (water)

5.3 Raeburn 2014 Well Installation.

Given that all historical boreholes on-site were thought to be lost or backfilled in the time elapsed since the SLR work, it was agreed that new boreholes should be drilled and installed with well screening to allow for sampling and testing of soil and groundwater from beneath the existing site area.

Drilling was not conducted within the new land area, or adjacent aggregate hardstanding area as these areas are subject to significant engineering / earthworks as a result of site redevelopment and any installed wells would be lost.

As noted previously, the new area of land to the southwest of the existing site has no history of industrial landuse and it is considered that the baseline conditions recorded beneath the existing site can reasonably be extrapolated to the new area. It is proposed that additional surface soil samples will be obtained from the new development area following the achievement of final ground levels and prior to the placement of aggregate sub-base and concrete surfacing. These samples will be subject to the same testing suite as the soils from the existing site area and the data recorded as an addendum to this report.

The new wells were installed during the week beginning 23rd June 2014, with purging and sampling of groundwater being undertaken the following week. Each location was surveyed to allow accurate plotting on site plans and the calculation of groundwater elevations. Well locations are shown on Figure 3.

All new boreholes were sunk to several metres below the main groundwater entry level, with Boreholes 14BH01, 14BH02 and 14BH03, reaching granite rockhead. Purging of the wells using a submersible pump, produced large volumes of water in all wells apart from BH3, where large amounts of running sand / silt entered the well and prevented effective purging. Significant sand / silt entry to the other wells was also noted, but to a lesser extent and did not prevent full purging prior to sampling.

Samples (including one anonymous water sample duplicate) were dispatched to the SAL commercial laboratory in East Kilbride for testing to the prior agreed suite of potential contaminants in accordance with SAL's accredited methodologies.

Ground conditions at each borehole location were in line with expectations. No visible or odorous indications of contamination were noted in any of the boreholes or samples recovered.

Copies of the drilling records and analytical certificates are provided in Appendices C and D respectively.

6 Site Condition Statement

As a result of the review of available information and the data from the latest site investigations, it is demonstrated that the current site conditions are as follows:

6.1 New Land Area

The area of land proposed as an addition to the site operational area has no history of industrial use. The site surface has been recently cleared of the planted tree cover, awaiting earthworks that will produce the required level surface for incorporation into the site operational area.

Current surface soil is a loose, sandy clay soil mixed with wood chippings from the vegetation clearance. None of this material is anticipated to remain on-site following redevelopment.

The soil cover is underlain by undisturbed, natural glacial till deposits that extend beyond the area boundaries in all directions and form a layer of unconsolidated clay rich, silty sand and gravel up to 10m thick. This material contains no identified sources of existing contamination and has not been impacted by contamination from any off-site sources.

The superficial deposits are underlain by granite bedrock, which also extend beyond the site boundaries in all directions.

Groundwater is present within the superficial sediments, generally sitting some 2-4m below the site surface. Hydraulic gradients are low and groundwater flow is expected to be sluggish due to the presence of low permeability clay horizons within the saturated zone. The new land area lies up topographic gradient and to the south of groundwater beneath the existing site and consequently groundwater quality represents natural conditions for the area in general.

6.2 Existing Site Area

The geological and hydrogeological conditions beneath the existing site area have previously been described in detail. The latest round of drilling and soil and groundwater sampling has reinforced previous investigations. There are no significant physical differences between the existing site area and the proposed new land area, apart from the presence of the industrial structures and surface cover constructed across the operational site and surrounding industrial estate plots.

Site area groundwater shows some indications of impacts from contaminants released by site operations and entering the sub-surface environment through permeable surfaces and leaking buried drainage. Contamination is not detected uniformly in all boreholes across the site area suggesting that impacts are localised and subject to attenuation and dilution by uncontaminated groundwater in surrounding strata. Overall groundwater quality has not altered significantly in the period since the last site investigations were undertaken (2005-2007).

6.3 Baseline Measurements

Baseline measurements of soil and groundwater quality have been made for the site area (considered representative of the combined operational site and proposed extension area). Measurements have been made for key potential contaminants based on the historical and current use of the operational site area.

Table 10 presents collated analytical data for soil samples collected in June 2014. Table 11 presents analytical data for groundwater samples collected at the same time. These data are directly comparable with the data presented in the tables from the GSS 2005 and SLR 2007 reports.

Locations within the existing site area that show no indications of contamination from site operations (Boreholes 14BH1 and 14BH4) are considered representative of background / natural conditions for the site area (including the proposed new land area).

Concentrations of key potential contaminants at other locations (Boreholes 14BH2 and 14BH3) are likely to be representative of historical impacts due to localised spills (at slab edges) or releases from damaged site drainage. Impacted groundwater is subject to ongoing natural attenuation (dispersion and dilution) and degradation (organic contaminants) within the shallow aquifer. There are no indications of major ongoing releases or significant sources (soil or groundwater) of contamination within the sub-surface itself.

In addition to the ongoing pollution prevention measures routinely adopted by the site, continued regular inspection and maintenance of the underground site drainage network and the sampling and testing of groundwater from the installed wells is required in order to demonstrate no ongoing deterioration of groundwater quality beneath the site.

Table 10. Soil Sample Analytical Results – Miscellaneous and Organic Parameters

Location	Depth	Soil Concentration						
		MC	Asbestos	Sulphate	TCE	TPH	VOC	SVOC
	m bgl	%	Visible Fibres	%	ug/kg	mg/kg	ug/kg	ug/kg
14BH1	0.50	19	ND	0.03	ND	ND	ND	ND
	3.00	12	ND	0.01	9	3		
14BH2	1.00	13	ND	0.05	10	6		
	3.00	3.5	ND	0.06	ND	19		
14BH3	1.00	11	ND	0.05	ND	1		
	3.00	16	ND	0.01	ND	ND		
14BH4	0.55	8	ND	0.06	NT	ND		
	1.50	26	ND	0.07	23	ND		

Table 10. Soil Sample Analytical Results – Toxic Metals and Metalloids

Location	Depth	Soil Concentration (mg/kg)										
		As	Ba	Cd	Cr	Cu	Pb	Hg	Ni	Se	V	Zn
	m bgl											
14BH1	0.50	10	120	ND	41	24	17	ND	29	ND	47	80
	3.00	ND	29	ND	10	7	4	ND	8	ND	7	17
14BH2	1.00	6	72	ND	26	14	11	ND	17	ND	28	39
	3.00	ND	130	ND	6	6	3	ND	4	ND	7	18
14BH3	1.00	4	40	ND	10	7	5	ND	7	ND	11	42
	3.00	ND	33	ND	11	8	5	ND	8	ND	12	20
14BH4	0.55	6	41	ND	18	13	9	ND	13	ND	23	37
	1.50	6	120	ND	51	27	18	ND	30	ND	58	59

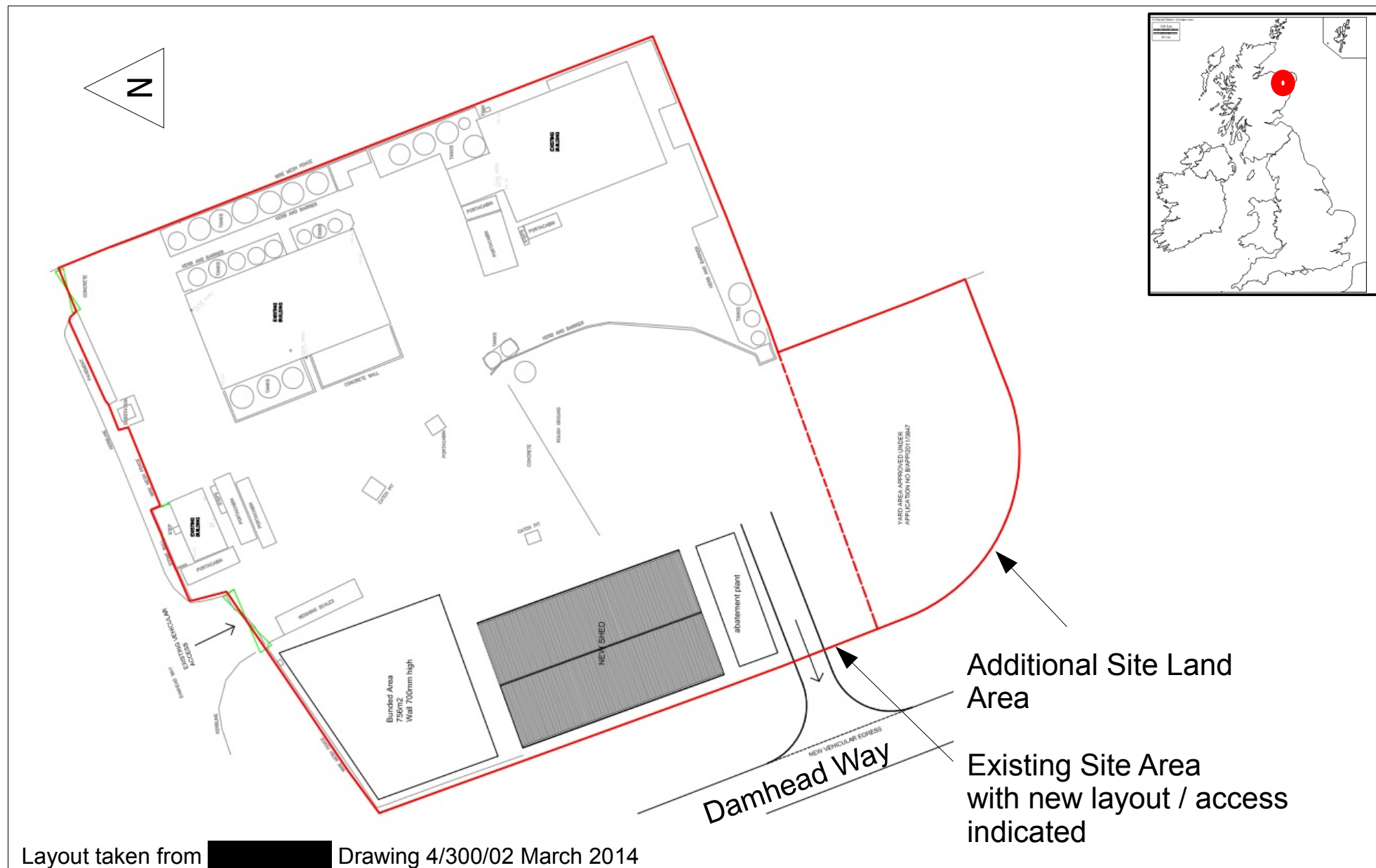
Table 11. Groundwater Sample Analytical Results - Miscellaneous and Organic Parameters

Location	Water Concentration								
	COD	Ammonia	Sulphate	Chloride	Fluoride	TPH	Cl Solvent	VOC	SVOC
	mg/l	mg/l	mg/l	mg/l	mg/l	ug/l	ug/l	ug/l	ug/l
14BH1	27	<0.05	33	100	<0.05	ND	ND	ND	ND
14BH2	70	1.4	71	450	0.18	ND	13	ND	ND
14BH2 Duplicate	72	1.3	64	430	<0.05	ND	13	ND	ND
14BH3	118	0.72	22	390	0.10	ND	5	ND	ND
14BH4	11	0.38	67	61	0.12	ND	ND	ND	ND

Table 11. Groundwater Sample Analytical Results - Toxic Metals and Metalloids

Location	Water Concentration (ug/l)										
	As	Ba	Cd	Cr	Cu	Pb	Hg	Ni	Se	V	Zn
14BH1	0.6	130	ND	2	3.9	0.5	ND	6	2.3	ND	5
14BH2	2.5	130	ND	7	5.5	0.3	ND	9	94	2	5
14BH2 Duplicate	2.4	120	ND	7	6.3	ND	ND	10	97	2	13
14BH3	2.9	120	ND	9	2.9	0.3	ND	17	51	3	16
14BH4	0.7	260	ND	1	2.1	ND	ND	4	2.8	ND	17

Figures



<i>Cookegan</i> Independent Environmental Consultancy	Client:	TWMA Ltd	Project:	Title:
			TWMA Peterhead Site Report Update	Site Location and Boundary Plan
	Job No:	TWMA01		Figure 1



Surface water drains
Foul sewer —

Layout taken from TWMA Drawing PHD-LY-00-00-3052 26/01/11

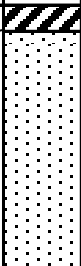
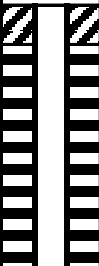
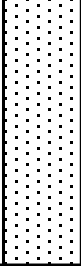
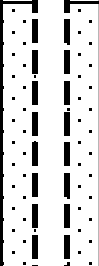
<i>Cookegan</i> Independent Environmental Consultancy	Client:	TWMA Ltd	Project:	Title:	Site Drainage Layout
			TWMA Peterhead Site Report Update		
	Job No:	TWMA01			Figure 2

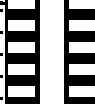
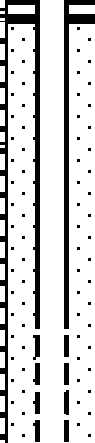
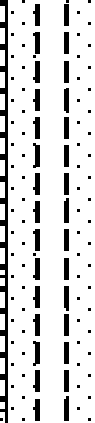
Appendix A

Borehole Logs

Project:		Project Ref:		Client:		Borehole No.		
Site Report Update				TWMA		14BH1		
Site Details:				Drilling Contractor:		Drill Rig Type:		
TWMA Yard Peterhead				Raeburn North		Cable Percussion		
Logged By:		Date	Started:		Location:		Diameter:	
			25.06.14		410965.546E 844752.777N		200mm	
Drill Crew:		Completed:		Elevation:				
Tyneside SI /		26.06.14		39.59m				
Depth (metres below ground level)	Sample Type	Sample Number	Groundwater	Description			Lithology Log	Completion Details
0.5	T	0.5m	▽ ▼	MADE GROUND - Concrete (pre-cored).				
1.0	B			MADE GROUND - Compacted grey angular aggregate with orange brown weathered surface.				
2.0	B			Firm red brown sandy silty CLAY with occasional fine to coarse gravel. Dry with no visible sedimentary structure.				
3.0	B / T	3m		becoming very sandy with gravel and occasional rounded cobbles. Moist.				
4.0	B			becoming soft.				
5.0	B			Firm grey brown very sandy silty CLAY with fine gravel. Becoming wet, slight reddening at interface.				
6.0	B			becoming soft and water saturated with layers of sand and rounded pebbles.				
				Loose brown gravelly SAND with rounded cobbles. Wet.				
				Hard pink GRANITE medium grained with white and black speckling. Fresh angular broken fragments.				
7.0				EOB - 6.30m				
8.0								
9.0								
10.0								

Project: Site Report Update				Project Ref:	Client: TWMA	Borehole No. 14BH2	
Site Details: TWMA Yard, Peterhead				Drilling Contractor: Raeburn North		Drill Rig Type: Cable Percussion	
Logged By: [REDACTED]				Started: 26.06.14	Location: 411033.817E 844760.284N	Diameter: 200mm	
Drill Crew: Tyneside SI / [REDACTED]				Completed: 27.06.14	Elevation: 38.79m		
Depth (metres below ground level)	Sample Type	Sample Number	Groundwater	Description		Lithology Log	Completion Details
0.5				MADE GROUND - Concrete (pre-cored).			
1.0	B / T	1m		Firm red brown very clayey SAND with fine angular and rounded fine to coarse gravel and occasional cobbles. Moist with no visible sedimentary structure.			
2.0	B			becoming wet and loose with more angular gravel			
3.0	B / T	3m		Soft pink brown very sandy GRAVEL with cobbles of granite and dark igneous rock.			
4.0	B			becoming darker brown and loose.			
5.0	B			Soft grey brown very sandy CLAY with occasional coarse gravel and cobbles and clay bands.			
6.0	B			Loose grey clayey SAND with much angular gravel and occasional cobbles. Wet.			
7.0	B			Hard pink GRANITE. Fresh angular fragments.			
8.0				EOB - 7.2m			
9.0							
10.0							

Project: Site Report Update				Project Ref:		Client: TWMA		Borehole No. 14BH3		
Site Details: TWMA Yard, Peterhead						Drilling Contractor: Raeburn North		Drill Rig Type: Cable Percussion		
Logged By: [REDACTED]				Date	Started: 26.06.14		Location: 411063.126E 844716.992N		Diameter: 200mm	
Drill Crew: Tyneside SI / [REDACTED]					Completed: 26.06.14		Elevation: 38.67m			
Depth (metres below ground level)	Sample Type	Sample Number	Groundwater	Description					Lithology Log	Completion Details
0.5	B / T	1m	▼	MADE GROUND - Concrete (pre-cored).						
1.0				Soft orange brown very clayey SAND with much fine to coarse gravel and occasional rounded cobbles.						
2.0	B	3m	▽	becoming wet with rounded and angular cobbles.						
3.0	B / T			becoming brown						
4.0	B			Loose mid brown sandy GRAVEL with angular cobbles of granite and occasional rounded quartz.						
5.0	B			Soft brown sandy CLAY with occasional fine to coarse angular and rounded gravel.						
				Hard pink GRANITE. Possible boulder not further progress.						
6.0				EOB - 5.1m						
7.0										
8.0										
9.0										
10.0										

Project: Site Report Update				Project Ref:		Client: TWMA		Borehole No. 14BH4	
Site Details: TWMA Yard, Peterhead						Drilling Contractor: Raeburn North		Drill Rig Type: Cable Percussion	
Logged By: [REDACTED]			Date	Started: 24.06.14		Location: 411052.220E 844813.744N		Diameter: 200mm	
Drill Crew: Tyneside SI / [REDACTED]				Completed: 25.06.14		Elevation: 38.69m			
Depth (metres below ground level)	Sample Type	Sample Number	Groundwater	Description				Lithology Log	Completion Details
0.5	T	0.55m		MADE GROUND - Concrete (pre-cored).					
				MADE GROUND - Compacted red brown angular aggregate and sand.					
1.0	B	1.5m		Firm red brown clayey sandy GRAVEL with rounded and angular cobbles of sandstone and granite.					
	T			Firm grey silty CLAY with brown sub-vertical laminae (possible root channels). Moist.					
2.0	B			Firm red brown sandy CLAY with fine to coarse gravel and occasional rounded cobble.					
3.0	B			Soft dark brown clayey SAND with much coarse angular gravel and occasional rounded cobble. Wet.					
		Soft dark grey brown very sandy CLAY with occasional coarse angular and rounded gravel and cobbles.							
6.0	B			Firm red brown very sandy CLAY with gravel.					
9.0			Loose red brown sandy fine to medium angular GRAVEL. Wet and blowing.						
		EOB - 9.0m							
10.0									

Appendix B

Site Area and Additional Land Photographs - 2014

Photographs taken on site walkover with site staff in attendance - 20th March 2014.



Photo 1 – Existing bin storage area in corner of site, with concrete surfacing. Surfacing has no raised kerbs at edges, but falls into site.



Photo 2 – Existing cuttings / slops storage tanks with bunding. Tanks are open topped and not pressurised.



Photo 3 – Corrugated steel bund separating eastern operational area from unused hardstanding. Slight oil seepage noted during visit.



Photo 4 – Southern site boundary with diesel storage tank. Concrete surfacing slightly raised above adjacent land.



Photo 5 – Oil storage tanks on eastern site boundary with site secondary access gate in background.



Photo 6 - Looking SW into new land area across unused hardstanding area in existing site.



Photo 7 – View of new land area following tree clearance, prior to earthworks to bring down to level of hardstanding area in foreground (boundary of existing site).



Photo 8 – View of boundary zone between new land area, existing TWMA site and southern neighbours. Note original dry stone dyke and established tree cover indicative of previous land use for new land site.

Appendix C

Drilling and Purging Records - 2014

Cable Percussion Complete?	Yes	☒
----------------------------	-----	-------------------------------------

Chiselling Time				
From	1:20	5:30	6:00	
To	1:40	6:00	6:30	
Hours	3/4 hr	3/4 hr	1 hr	

Water Added (to assist boring)				
From				
To				
Rate				

Inspection Pit	
Depth 1.20m	Time (hr) 14R
Area 0.50 x 0.5	

SOFT GROUND BORING DAILY REPORT

Site: TWHA	
Job No: N2382	Borehole: 1

[illegible][illegible]

Depth of Casing (at completion of borehole or end of shift)			
200mm to	6.30	150mm to	mm to Rotary Casing to

Time Spent			Standing Times	
Total Hours this sheet:	Number of Hours Boring:		(i)	(details)
Moving from bh:	to bh:	Time (hrs):	(ii)	In Remarks)

Remarks:	SET UP ON BH 1
	DIG PIT TO 120M
	FINISH AT 4PM DUE TO NOT ENOUGH SOLID PIPE ON
	SITE. 1HR TRAVEL BACK TO GET PIPE.
	REINSTATE BH 1, 1 1/2 HRS

Backfill	From	To
Type:		
Type:		
Installation		(details on
Depth:		att. Sheet)

Rig Type: DAVID 2000 mk2	No: 1
Driller (1)	
Driller (2)	

Day: WED Date: 25.6.14 Sheet: 2

INSTALLATION RECORD

day **THURS** date **26 6 14**

b/hole **1**

site **TWMA**

job no. **N2382**

Final depth of borehole				6.30	
Piezometer		Standpipe	☒	Diameter (mm)	50

Sketch

Backfill from base of hole to base of installation					
Type		From		To	

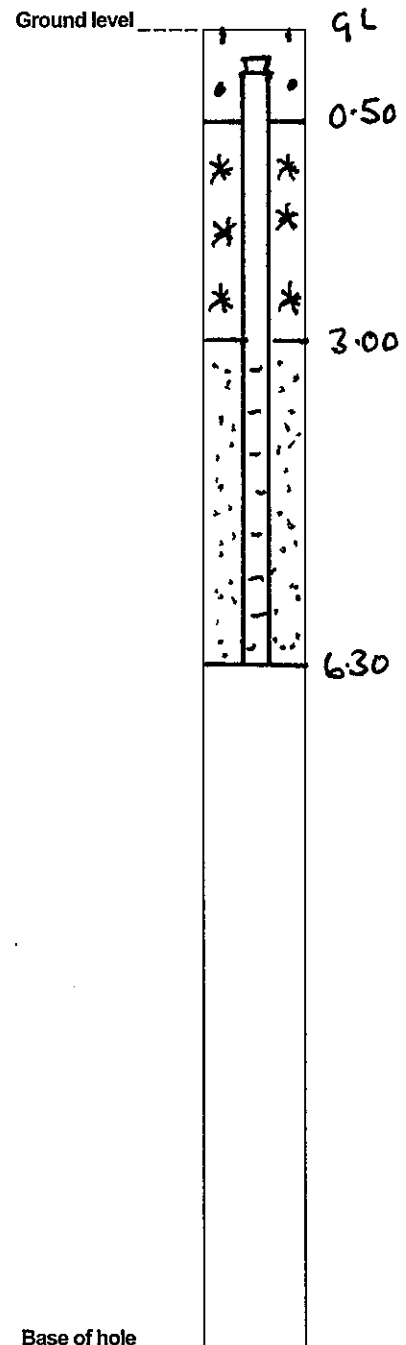
piezometer	Bottom seal	From		To	
	Sand filter	From		To	
	Base of piezo element			At	
	Top seal	From		To	
	Grout backfill	From		To	
	Concrete	From		To	

standpipe	Gravel filter	From	6.30	To	3.00
	Base of tubing			At	
	Geotextile wrap	From		To	
	Grout backfill	From		To	
	Bentonite Seal (1)	From	3.00	To	0.50
	Bentonite Seal (2)	From		To	
	Bentonite Seal (3)	From		To	
	Concrete	From	0.50	To	GL

Bottom plug	☒	Top Cap	☒	Gas Valve	☐
-------------	-------------------------------------	---------	-------------------------------------	-----------	--------------------------

Protective cover	Flush?	☒	Upstand?	☐
------------------	--------	-------------------------------------	----------	--------------------------

Protective fencing?		Detail below



Time to install (h) **1.14**

Driller **[REDACTED]**

Day: THURS Date: 26.6.14 Sheet: 2

INSTALLATION RECORD

day

PR1

date

27 6 14

b/hole

2

job no.

N2382

site

TWMA

Final depth of borehole				7.20	
Piezometer		Standpipe	✓	Diameter (mm)	50

Sketch

Backfill from base of hole to base of installation					
Type		From		To	

piezometer

Bottom seal	From		To	
Sand filter	From		To	
Base of piezo element			At	
Top seal	From		To	
Grout backfill	From		To	
Concrete	From		To	

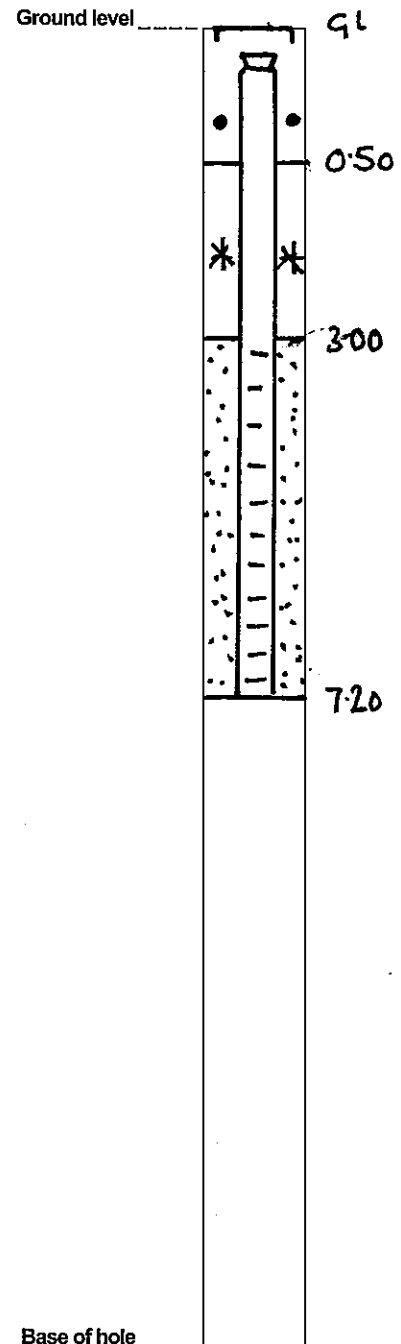
standpipe

Gravel filter	From	7.20	To	3.00
Base of tubing			At	7.20
Geotextile wrap	From		To	
Grout backfill	From		To	
Bentonite Seal (1)	From	3.00	To	0.50
Bentonite Seal (2)	From		To	
Bentonite Seal (3)	From		To	
Concrete	From	0.50	To	GL

Bottom plug	✓	Top Cap	✓	Gas Valve	
-------------	---	---------	---	-----------	--

Protective cover	Flush?	✓	Upstand?	
------------------	--------	---	----------	--

Protective fencing?		Detail below



Time to install (h) 1HR

Driller

RAEBURN
DRILLING & GEOTECHNICAL (NORTHERN) LTD

INSTALLATION RECORD

day **THUR** date **26 6 14**

b/hole **3**

site **TWMA**

job no. **N2382**

Final depth of borehole			5.20		
Piezometer		Standpipe	☒	Diameter (mm)	50

Sketch

Backfill from base of hole to base of installation					
Type		From		To	

piezometer

Bottom seal	From		To	
Sand filter	From		To	
Base of piezo element			At	
Top seal	From		To	
Grout backfill	From		To	
Concrete	From		To	

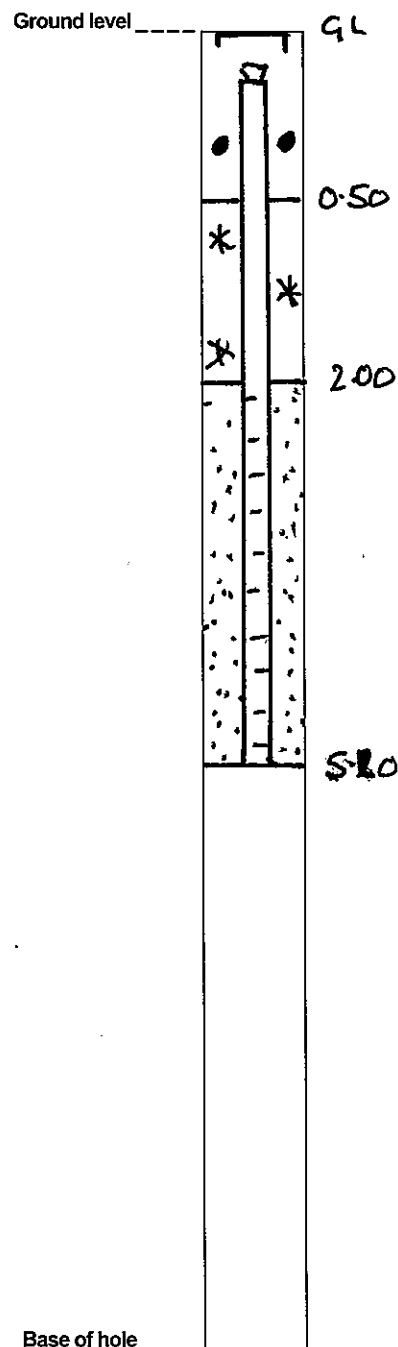
standpipe

Gravel filter	From	5.10	To	2.00
Base of tubing			At	5.10
Geotextile wrap	From		To	
Grout backfill	From		To	
Bentonite Seal (1)	From	2.00	To	0.50
Bentonite Seal (2)	From		To	
Bentonite Seal (3)	From		To	
Concrete	From	0.50	To	GL

Bottom plug	☒	Top Cap	☒	Gas Valve	☐
-------------	-------------------------------------	---------	-------------------------------------	-----------	--------------------------

Protective cover	Flush?	☒	Upstand?	☐
------------------	--------	-------------------------------------	----------	--------------------------

Protective fencing?		Detail below



Time to install (h) **1.42**

Driller **[REDACTED]**

INSTALLATION RECORD

day

WED

date

25 6 14

b/hole

4

job no.

N2382

site

TWMA

Final depth of borehole

Piezometer

Standpipe

Diameter (mm)

Sketch

Backfill from base of hole to base of installation

Type

From

To

Ground level

GL

0.50

4.00

9.00

Base of hole

piezometer

Bottom seal

From

To

Sand filter

From

To

Base of piezo element

At

Top seal

From

To

Grout backfill

From

To

Concrete

From

To

standpipe

Gravel filter

From

9.00

To

4.00

Base of tubing

At

Geotextile wrap

From

To

Grout backfill

From

To

Bentonite Seal (1)

From

4.00

To

0.50

Bentonite Seal (2)

From

To

Bentonite Seal (3)

From

To

Concrete

From

0.50

To

GL

Bottom plug

✓

Top Cap

✓

Gas Valve

Protective cover

Flush?

✓

Upstand?

Protective fencing?

Detail below

Time to install (h)

1 HR

Driller

RAEBURN
DRILLING & GEOTECHNICAL (NORTHERN) LTD

Groundwater Purging Record Sheet

Site:	TWMA, Peterhead	Contract Number:	N2382	Date:	03/07/2014
Purging equipment used:	Whale Pump	Person Sampling:	IH	Weather:	Sunny / Dry

Well ID	BH01	BH02	BH03	BH04		
Condition of well:						
- any damage	No	No	No	No		
- Bung present	Yes	Yes	Yes	Yes		
- other	--	--	--	--		
Depth to base of well from ground surface (m)	5.41	6.35	3.35	7.55		
Volume of water to purge	3 well volumes	3 well volumes	3 well volumes	3 well volumes		
Depth to water surface before purging (m)	4.77	2.63	2.47	3.62		
Depth to water after purging (m)	4.83	2.60	2.89	3.64		
Purged dry (Y/N)	No	No	Yes (slow return)	No		
Sample description:						
- colour	Brown becoming clear	Brown becoming clear	Orange brown	Brown becoming clear		
- sediment load	Mod becoming low	Mod becoming low	High	Moderate becoming low		
- odour	--	--	--	--		
- other	--	--	--	--		
Well capped and locked (Y/N)	Yes	Yes	Yes	Yes		
Comments						
Depth of BH after purging (mbGL)	5.45	6.19	3.03	7.53		
Sample Collected	--	--	--	--		

Appendix D
Laboratory Certificates



Scientific Analysis Laboratories is a
limited company registered in England and
Wales (No 2514788) whose address is at
Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

16 Langlands Place
Kelvin South Business
Park
East Kilbride
G75 0YF
Tel : 01355 573340
Fax : 01355 573341

Report Number: 407351-1

Date of Report: 24-Jul-2014

Customer: TWMA
Unit 12
Dales Industrial Estate
Peterhead
AB42 3JF

Customer Contact: [REDACTED]

Customer Job Reference:

Customer Site Reference: Peterhead Site Report

Date Job Received at SAL: 07-Jul-2014

Date Analysis Started: 11-Jul-2014

Date Analysis Completed: 24-Jul-2014

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with QP22



Report checked
and authorised by :
[REDACTED]
Customer Relations Manager

Issued by :
[REDACTED]
Customer Relations Manager

Project Site: Peterhead Site Report
Customer Reference:

Water	Analysed as Water
Miscellaneous	

SAL Reference					407351 009	407351 010	407351 011	407351 012	407351 013
Customer Sample Reference					BH1 W1	BH2 W1	BH3 W1	BH4 W1	BH5 W1
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014
Determinand	Method	Test Sample	LOD	Units					
Ammoniacal nitrogen	T686	AR	0.05	mg/l	<0.05	1.4	0.72	0.38	1.3
COD (Total)	T179	AR	5	mg/l	27	70	118	11	72
Chloride	T686	AR	1	mg/l	100	450	390	61	430
Fluoride	T686	AR	0.05	mg/l	<0.05	0.18	0.10	0.12	<0.05
Sulphate ion	T686	AR	0.5	mg/l	33	71	22	67	64

Soil	Analysed as Soil
Miscellaneous	

Soil	Analysed as Soil
Miscellaneous	

Project Site: Peterhead Site Report
Customer Reference:

Water	Analysed as Water
SVOC 625 + Tentatively Identified Compounds	

Project Site: Peterhead Site Report
Customer Reference:

Water	Analysed as Water
Semi-Volatile Organic Compounds (USEPA 625) Low Level	

Produced by Scientific Analysis Laboratories Ltd, 16 Langlands Place, Kelvin South Business Park, East Kilbride, G75 0YF Page 5 of 25
407351-1

Water	Analysed as Water
Semi-Volatile Organic Compounds (USEPA 625) Low Level	

SAL Reference	407351 015
Customer Sample Reference	Lab Blank
Date Sampled	07-JUL-2014

Determinand	Method	Test Sample	LOD	Units	
Phenol	T71	AR	1	µg/l	<1
Bis (2-chloroethyl) ether	T71	AR	1	µg/l	<1
2-Chlorophenol	T71	AR	1	µg/l	<1
1,3-Dichlorobenzene	T71	AR	1	µg/l	<1
1,4-Dichlorobenzene	T71	AR	1	µg/l	<1
1,2-Dichlorobenzene	T71	AR	1	µg/l	<1
Bis (2-chloroisopropyl) ether	T71	AR	1	µg/l	<1
2-methyl phenol	T71	AR	1	µg/l	<1
3/4-Methylphenol	T71	AR	1	µg/l	<1
Hexachloroethane	T71	AR	1	µg/l	<1
Nitrobenzene	T71	AR	1	µg/l	<1
Isophorone	T71	AR	1	µg/l	<1
2-Nitrophenol	T71	AR	1	µg/l	<1
2,4-Dimethylphenol	T71	AR	1	µg/l	<1
Bis (2-chloroethoxy) methane	T71	AR	1	µg/l	<1
2,4-Dichlorophenol	T71	AR	1	µg/l	<1
1,2,4-Trichlorobenzene	T71	AR	1	µg/l	<1
Naphthalene	T71	AR	1	µg/l	<1
4-Chloroaniline	T71	AR	1	µg/l	<1
Hexachlorobutadiene	T71	AR	1	µg/l	<1
4-Chloro-3-methylphenol	T71	AR	1	µg/l	<1
2-Methylnaphthalene	T71	AR	1	µg/l	<1
Hexachlorocyclopentadiene	T71	AR	1	µg/l	<1
2,4,6-Trichlorophenol	T71	AR	1	µg/l	<1
2,4,5-Trichlorophenol	T71	AR	1	µg/l	<1
2-Chloronaphthalene	T71	AR	1	µg/l	<1
2-Nitroaniline	T71	AR	1	µg/l	<1
Dimethyl phthalate	T71	AR	1	µg/l	<1
2,6-Dinitrotoluene	T71	AR	1	µg/l	<1
Acenaphthylene	T71	AR	1	µg/l	<1
Acenaphthene	T71	AR	1	µg/l	<1
3-Nitroaniline	T71	AR	1	µg/l	<1
2,4-Dinitrophenol	T71	AR	1	µg/l	<1
Dibenzofuran	T71	AR	1	µg/l	<1
2,4-Dinitrotoluene	T71	AR	1	µg/l	<1
4-Nitrophenol	T71	AR	1	µg/l	<1
Diethyl phthalate	T71	AR	1	µg/l	<1
Fluorene	T71	AR	1	µg/l	<1
4-Chlorophenyl phenylether	T71	AR	1	µg/l	<1
4-Nitroaniline	T71	AR	1	µg/l	<1
Azobenzene	T71	AR	1	µg/l	<1
4-Bromophenyl phenylether	T71	AR	1	µg/l	<1
Hexachlorobenzene	T71	AR	1	µg/l	<1
Pentachlorophenol	T71	AR	1	µg/l	<1
Phenanthrene	T71	AR	1	µg/l	<1
Anthracene	T71	AR	1	µg/l	<1
Carbazole	T71	AR	1	µg/l	<1
Di-n-butylphthalate	T71	AR	1	µg/l	<1
Fluoranthene	T71	AR	1	µg/l	<1
Pyrene	T71	AR	1	µg/l	<1
Butyl benzylphthalate	T71	AR	1	µg/l	<1
Benzo(a)Anthracene	T71	AR	1	µg/l	<1
Chrysene	T71	AR	1	µg/l	<1
Bis (2-ethylhexyl)phthalate	T71	AR	1	µg/l	<1
Di-n-octylphthalate	T71	AR	1	µg/l	<1
Benzo(b/k)Fluoranthene	T71	AR	1	µg/l	<1
Benzo(a)Pyrene	T71	AR	1	µg/l	<1
Indeno(123-cd)Pyrene	T71	AR	1	µg/l	<1
Dibenzo(ah)Anthracene	T71	AR	1	µg/l	<1
Benzo(ghi)Perylene	T71	AR	1	µg/l	<1

SAL Reference: 407351										
Project Site: Peterhead Site Report										
Customer Reference:										
Soil										

SAL Reference: 407351									
Project Site: Peterhead Site Report									
Customer Reference:									
Soil		Analysed as Soil							
SVOC 625 + Tentatively Identified Compounds									
SAL Reference					407351 006	407351 007	407351 008	407351 014	
Customer Sample Reference					BH3 3.00M	BH4 0.55M	BH4 1.50M	Lab Blank	
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014	07-JUL-2014	
Type					Sandy Soil	Fill	Clay		
Determinand	Method	Test Sample	LOD	Units					
SVOC screen	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	

Soil	Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)	

407351-1

Soil	Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)	

Determinand	Method	Test Sample	LOD	Units					
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1

Soil	Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)	

Produced by Scientific Analysis Laboratories Ltd, 16 Langlands Place, Kelvin South Business Park, East Kilbride, G75 0YF Page 10 of 25
407351-1

SAL Reference: 407351								
Project Site: Peterhead Site Report								
Customer Reference:								
Soil		Analysed as Soil						
Semi-Volatile Organic Compounds (USEPA 625)								
SAL Reference		407351 006		407351 007		407351 008		407351 014
Customer Sample Reference		BH3 3.00M		BH4 0.55M		BH4 1.50M		Lab Blank
Date Sampled		03-JUL-2014		03-JUL-2014		03-JUL-2014		07-JUL-2014
Type		Sandy Soil		Fill		Clay		
Determinand		Method	Test Sample	LOD	Units			
Benzo(ghi)Perylene		T16	AR	0.1	ma/kg	<0.1	<0.1	<0.1



SAL Reference: 407351
Project Site: Peterhead Site Report
Customer Reference:

Water Analysed as Water
Suite A

SAL Reference					407351 009	407351 010	407351 011	407351 012	407351 013
Customer Sample Reference					BH1 W1	BH2 W1	BH3 W1	BH4 W1	BH5 W1
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014
Determinand	Method	Test Sample	LOD	Units					
As (Dissolved)	T281	AR	0.2	µg/l	0.6	2.5	2.9	0.7	2.4
Ba (Dissolved)	T281	AR	1	µg/l	130	130	120	260	120
Cd (Dissolved)	T281	AR	5.0	µg/l	<5.0	<5.0	<5.0	<5.0	<5.0
Cr (Dissolved)	T281	AR	1	µg/l	2	7	9	1	7
Cu (Dissolved)	T281	AR	0.5	µg/l	3.9	5.5	2.9	2.1	6.3
Pb (Dissolved)	T281	AR	0.3	µg/l	0.5	0.3	0.3	<0.3	<0.3
Hg (Dissolved)	T281	AR	0.05	µg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Ni (Dissolved)	T281	AR	1	µg/l	6	9	17	4	10
Se (Dissolved)	T281	AR	0.5	µg/l	2.3	94	51	2.8	97
V (Dissolved)	T281	AR	2	µg/l	<2	2	3	<2	2
Zn (Dissolved)	T281	AR	2	µg/l	5	9	16	17	13



Project Site: Peterhead Site Report
Customer Reference:

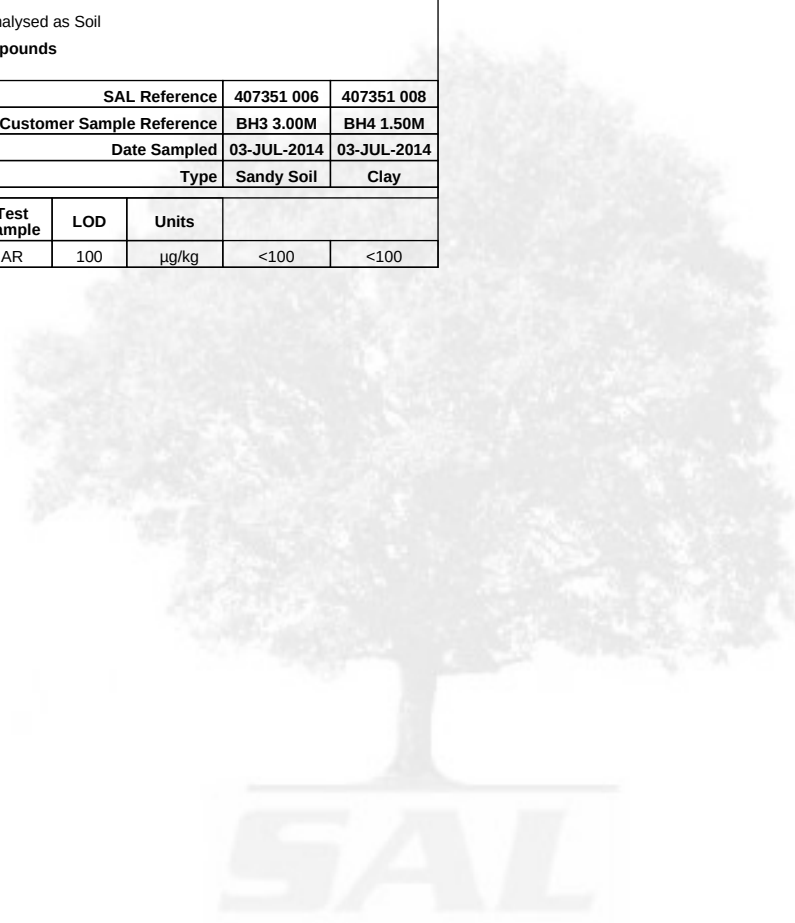
SAL Reference					407351 009	407351 010	407351 011	407351 012	407351 013
Customer Sample Reference					BH1 W1	BH2 W1	BH3 W1	BH4 W1	BH5 W1
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014
Determinand	Method	Test Sample	LOD	Units					
TPH (C5-C6 aliphatic)	T215	AR	10	µg/l	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T215	AR	10	µg/l	<10	<10	<10	<10	<10
TPH (C8-C10 aliphatic)	T215	AR	10	µg/l	<10	<10	<10	<10	<10
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	<0.01	⁽¹³⁾ <0.01	<0.01	<0.01	<0.01
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	⁽¹³⁾ <0.01	<0.01	<0.01	<0.01	<0.01
TPH (C6-C7 aromatic)	T215	AR	10	µg/l	<10	<10	<10	<10	<10
TPH (C7-C8 aromatic)	T215	AR	10	µg/l	<10	<10	<10	<10	<10
TPH (C8-C10 aromatic)	T215	AR	10	µg/l	<10	<10	<10	<10	<10
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01

SAL Reference: 407351 Project Site: Peterhead Site Report Customer Reference:									
Soil					Analysed as Soil				
TPH (CWG)									
SAL Reference					407351 001	407351 002	407351 003	407351 004	407351 005
Customer Sample Reference					BH1 0.50M	BH1 3.00M	BH2 1.00M	BH2 3.00M	BH3 1.00M
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014
Type					Clay	Sandy Soil	Clay	Sandy Soil	Fill
Determinand	Method	Test Sample	LOD	Units					
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	<1	<1	3	6	<1
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	<1	2	2	7	1
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	<1	<1	1	3	<1
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	<1	1	<1	3	<1

SAL Reference: 407351 Project Site: Peterhead Site Report Customer Reference:							
Soil		Analysed as Soil					
TPH (CWG)							
SAL Reference					407351 006	407351 007	407351 008
Customer Sample Reference					BH3 3.00M	BH4 0.55M	BH4 1.50M
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014
Type					Sandy Soil	Fill	Clay
Determinand	Method	Test Sample	LOD	Units			
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	<1	<1	<1

SAL Reference: 407351 Project Site: Peterhead Site Report Customer Reference:										
Soil Analysed as Soil										
VOC 624 + Tentatively Identified Compounds										
SAL Reference					407351 001	407351 002	407351 003	407351 004	407351 005	
Customer Sample Reference					BH1 0.50M	BH1 3.00M	BH2 1.00M	BH2 3.00M	BH3 1.00M	
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014	
Type					Clay	Sandy Soil	Clay	Sandy Soil	Fill	
Determinand	Method	Test Sample	LOD	Units						
VOC Screen	T54	AR	100	µg/kg	<100	<100	<100	<100	<100	

SAL Reference: 407351 Project Site: Peterhead Site Report Customer Reference: Soil Analysed as Soil VOC 624 + Tentatively Identified Compounds						
SAL Reference		407351 006	407351 008			
Customer Sample Reference		BH3 3.00M	BH4 1.50M			
Date Sampled		03-JUL-2014	03-JUL-2014			
Type		Sandy Soil	Clay			
Determinand	Method	Test Sample	LOD	Units		
VOC Screen	T54	AR	100	µg/kg	<100	<100



Soil	Analysed as Soil
Volatile Organic Compounds (USEPA 624)	

407351-1

Project Site: Peterhead Site Report
Customer Reference:

Water	Analysed as Water
VOC 624 + Tentatively Identified Compounds	

SAL Reference					407351 009	407351 010	407351 011	407351 012	407351 013
Customer Sample Reference					BH1 W1	BH2 W1	BH3 W1	BH4 W1	BH5 W1
Date Sampled					03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014	03-JUL-2014
Determinand	Method	Test Sample	LOD	Units					
VOC Screen (Extra Peaks)	T54	AR	10	µg/l	<10	<10	<10	<10	<10

Volatile Organic Compounds (USEPA 624)

407351-1

Index to symbols used in 407351-1

Value	Description
AR	As Received
N.D.	Not Detected
13	Results have been blank corrected.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Metals analysis was carried out at SAL Manchester.

Method Index

Value	Description
T81	GC/FID (LV)
T162	Grav (1 Dec) (105 C)
T215	GC/MS (Headspace)(LV)
T245	ICP/OES(Aqua Regia Extraction)
T281	ICP/MS (Filtered)
T16	GC/MS
T686	Discrete Analyser
T71	GC/MS (1l ext.)
T8	GC/FID
T27	PLM
T54	GC/MS (Headspace)
T6	ICP/OES
T82	ICP/OES (Sim)
T179	Colorimetry (XION 500)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Ammoniacal nitrogen	T686	AR	0.05	mg/l	U	009-013
COD (Total)	T179	AR	5	mg/l	U	009-013
Chloride	T686	AR	1	mg/l	U	009-013
Fluoride	T686	AR	0.05	mg/l	N	009-013
Sulphate ion	T686	AR	0.5	mg/l	N	009-013
Asbestos ID	T27	AR			SU	001-008
Moisture @ 105 C	T162	AR	0.1	%	N	001-008
SO4(Total)	T82	AR	0.01	%	N	001-008
SVOC screen	T16	AR	10	µg/l	N	009-013,015
Phenol	T71	AR	1	µg/l	U	009-013,015
Bis (2-chloroethyl) ether	T71	AR	1	µg/l	U	009-013,015
2-Chlorophenol	T71	AR	1	µg/l	U	009-013,015
1,3-Dichlorobenzene	T71	AR	1	µg/l	U	009-013,015
1,4-Dichlorobenzene	T71	AR	1	µg/l	U	009-013,015
1,2-Dichlorobenzene	T71	AR	1	µg/l	U	009-013,015
Bis (2-chloroisopropyl) ether	T71	AR	1	µg/l	U	009-013,015
2-methyl phenol	T71	AR	1	µg/l	U	009-013,015
3/4-Methylphenol	T71	AR	1	µg/l	U	009-013,015
Hexachloroethane	T71	AR	1	µg/l	U	009-013,015
Nitrobenzene	T71	AR	1	µg/l	U	009-013,015
Isophorone	T71	AR	1	µg/l	U	009-013,015
2-Nitrophenol	T71	AR	1	µg/l	U	009-013,015
2,4-Dimethylphenol	T71	AR	1	µg/l	U	009-013,015
Bis (2-chloroethoxy) methane	T71	AR	1	µg/l	U	009-013,015
2,4-Dichlorophenol	T71	AR	1	µg/l	U	009-013,015
1,2,4-Trichlorobenzene	T71	AR	1	µg/l	U	009-013,015
Naphthalene	T71	AR	1	µg/l	U	009-013,015
4-Chloroaniline	T71	AR	1	µg/l	U	009-013,015
Hexachlorobutadiene	T71	AR	1	µg/l	U	009-013,015
4-Chloro-3-methylphenol	T71	AR	1	µg/l	U	009-013,015
2-Methylnaphthalene	T71	AR	1	µg/l	U	009-013,015

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Hexachlorocyclopentadiene	T71	AR	1	µg/l	U	009-013,015
2,4,6-Trichlorophenol	T71	AR	1	µg/l	U	009-013,015
2,4,5-Trichlorophenol	T71	AR	1	µg/l	U	009-013,015
2-Chloronaphthalene	T71	AR	1	µg/l	U	009-013,015
2-Nitroaniline	T71	AR	1	µg/l	U	009-013,015
Dimethyl phthalate	T71	AR	1	µg/l	U	009-013,015
2,6-Dinitrotoluene	T71	AR	1	µg/l	U	009-013,015
Acenaphthylene	T71	AR	1	µg/l	U	009-013,015
Acenaphthene	T71	AR	1	µg/l	U	009-013,015
3-Nitroaniline	T71	AR	1	µg/l	U	009-013,015
2,4-Dinitrophenol	T71	AR	1	µg/l	U	009-013,015
Dibenzofuran	T71	AR	1	µg/l	U	009-013,015
2,4-Dinitrotoluene	T71	AR	1	µg/l	U	009-013,015
4-Nitrophenol	T71	AR	1	µg/l	U	009-013,015
Diethyl phthalate	T71	AR	1	µg/l	U	009-013,015
Fluorene	T71	AR	1	µg/l	U	009-013,015
4-Chlorophenyl phenylether	T71	AR	1	µg/l	U	009-013,015
4-Nitroaniline	T71	AR	1	µg/l	U	009-013,015
Azobenzene	T71	AR	1	µg/l	U	009-013,015
4-Bromophenyl phenylether	T71	AR	1	µg/l	U	009-013,015
Hexachlorobenzene	T71	AR	1	µg/l	U	009-013,015
Pentachlorophenol	T71	AR	1	µg/l	U	009-013,015
Phenanthrene	T71	AR	1	µg/l	U	009-013,015
Anthracene	T71	AR	1	µg/l	U	009-013,015
Carbazole	T71	AR	1	µg/l	U	009-013,015
Di-n-butylphthalate	T71	AR	1	µg/l	U	009-013,015
Fluoranthene	T71	AR	1	µg/l	U	009-013,015
Pyrene	T71	AR	1	µg/l	U	009-013,015
Butyl benzylphthalate	T71	AR	1	µg/l	U	009-013,015
Benzo(a)Anthracene	T71	AR	1	µg/l	U	009-013,015
Chrysene	T71	AR	1	µg/l	U	009-013,015
Bis (2-ethylhexyl)phthalate	T71	AR	1	µg/l	U	009-013,015
Di-n-octylphthalate	T71	AR	1	µg/l	U	009-013,015
Benzo(b/k)Fluoranthene	T71	AR	1	µg/l	U	009-013,015
Benzo(a)Pyrene	T71	AR	1	µg/l	U	009-013,015
Indeno(123-cd)Pyrene	T71	AR	1	µg/l	U	009-013,015
Dibenzo(ah)Anthracene	T71	AR	1	µg/l	U	009-013,015
Benzo(ghi)Perylene	T71	AR	1	µg/l	U	009-013,015
SVOC screen	T16	AR	0.1	mg/kg	N	001-008,014
Phenol	T16	AR	0.1	mg/kg	U	001-008,014
Bis (2-chloroethyl) ether	T16	AR	0.1	mg/kg	U	001-008,014
2-Chlorophenol	T16	AR	0.1	mg/kg	U	001-008,014
1,3-Dichlorobenzene	T16	AR	0.1	mg/kg	U	001-008,014
1,4-Dichlorobenzene	T16	AR	0.1	mg/kg	U	001-008,014
1,2-Dichlorobenzene	T16	AR	0.1	mg/kg	U	001-008,014
Bis (2-chloroisopropyl) ether	T16	AR	0.1	mg/kg	U	001-008,014
2-methyl phenol	T16	AR	0.1	mg/kg	U	001-008,014
3/4-Methylphenol	T16	AR	0.1	mg/kg	U	001-008,014
Hexachloroethane	T16	AR	0.1	mg/kg	U	001-008,014
Nitrobenzene	T16	AR	0.1	mg/kg	U	001-008,014
Isophorone	T16	AR	0.1	mg/kg	U	001-008,014
2-Nitrophenol	T16	AR	0.1	mg/kg	U	001-008,014
2,4-Dimethylphenol	T16	AR	0.1	mg/kg	U	001-008,014
Bis (2-chloroethoxy) methane	T16	AR	0.1	mg/kg	U	001-008,014
2,4-Dichlorophenol	T16	AR	0.1	mg/kg	U	001-008,014
1,2,4-Trichlorobenzene	T16	AR	0.1	mg/kg	U	001-008,014
Naphthalene	T16	AR	0.1	mg/kg	U	001-008,014
4-Chloroaniline	T16	AR	0.1	mg/kg	U	001-008,014
Hexachlorobutadiene	T16	AR	0.1	mg/kg	U	001-008,014
4-Chloro-3-methylphenol	T16	AR	0.1	mg/kg	U	001-008,014
2-Methylnaphthalene	T16	AR	0.1	mg/kg	U	001-008,014
Hexachlorocyclopentadiene	T16	AR	0.1	mg/kg	U	001-008,014
2,4,6-Trichlorophenol	T16	AR	0.1	mg/kg	U	001-008,014
2,4,5-Trichlorophenol	T16	AR	0.1	mg/kg	U	001-008,014
2-Chloronaphthalene	T16	AR	0.1	mg/kg	U	001-008,014
2-Nitroaniline	T16	AR	0.1	mg/kg	U	001-008,014
Dimethyl phthalate	T16	AR	0.1	mg/kg	U	001-008,014
2,6-Dinitrotoluene	T16	AR	0.1	mg/kg	U	001-008,014
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-008,014
Acenaphthene	T16	AR	0.1	mg/kg	U	001-008,014

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
3-Nitroaniline	T16	AR	0.1	mg/kg	U	001-008,014
2,4-Dinitrophenol	T16	AR	0.1	mg/kg	U	001-008,014
Dibenzofuran	T16	AR	0.1	mg/kg	U	001-008,014
2,4-Dinitrotoluene	T16	AR	0.1	mg/kg	U	001-008,014
4-Nitrophenol	T16	AR	0.1	mg/kg	U	001-008,014
Diethyl phthalate	T16	AR	0.1	mg/kg	U	001-008,014
Fluorene	T16	AR	0.1	mg/kg	U	001-008,014
4-Chlorophenyl phenylether	T16	AR	0.1	mg/kg	U	001-008,014
4-Nitroaniline	T16	AR	0.1	mg/kg	U	001-008,014
Azobenzene	T16	AR	0.1	mg/kg	U	001-008,014
4-Bromophenyl phenylether	T16	AR	0.1	mg/kg	U	001-008,014
Hexachlorobenzene	T16	AR	0.1	mg/kg	U	001-008,014
Pentachlorophenol	T16	AR	0.1	mg/kg	U	001-008,014
Phenanthrene	T16	AR	0.1	mg/kg	U	001-008,014
Anthracene	T16	AR	0.1	mg/kg	U	001-008,014
Carbazole	T16	AR	0.1	mg/kg	U	001-008,014
Di-n-butylphthalate	T16	AR	0.1	mg/kg	U	001-008,014
Fluoranthene	T16	AR	0.1	mg/kg	U	001-008,014
Pyrene	T16	AR	0.1	mg/kg	U	001-008,014
Butyl benzylphthalate	T16	AR	0.1	mg/kg	U	001-008,014
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	U	001-008,014
Chrysene	T16	AR	0.1	mg/kg	U	001-008,014
Bis (2-ethylhexyl)phthalate	T16	AR	0.1	mg/kg	U	001-008,014
Di-n-octylphthalate	T16	AR	0.1	mg/kg	U	001-008,014
Benzo(b/k)Fluoranthene	T16	AR	0.1	mg/kg	U	001-008,014
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	U	001-008,014
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	U	001-008,014
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	U	001-008,014
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	U	001-008,014
As (Dissolved)	T281	AR	0.2	µg/l	U	009-013
Ba (Dissolved)	T281	AR	1	µg/l	U	009-013
Cd (Dissolved)	T281	AR	5.0	µg/l	U	009-013
Cr (Dissolved)	T281	AR	1	µg/l	U	009-013
Cu (Dissolved)	T281	AR	0.5	µg/l	U	009-013
Pb (Dissolved)	T281	AR	0.3	µg/l	U	009-013
Hg (Dissolved)	T281	AR	0.05	µg/l	U	009-013
Ni (Dissolved)	T281	AR	1	µg/l	U	009-013
Se (Dissolved)	T281	AR	0.5	µg/l	U	009-013
V (Dissolved)	T281	AR	2	µg/l	U	009-013
Zn (Dissolved)	T281	AR	2	µg/l	U	009-013
Arsenic	T245	AR	2	mg/kg	M	001-004,006,008
Arsenic	T245	AR	2	mg/kg	U	005,007
Barium	T6	AR	1	mg/kg	U	001-008
Cadmium	T6	AR	1	mg/kg	M	001-004,006,008
Cadmium	T6	AR	1	mg/kg	U	005,007
Chromium	T6	AR	1	mg/kg	M	001-004,006,008
Chromium	T6	AR	1	mg/kg	U	005,007
Copper	T6	AR	1	mg/kg	M	001-004,006,008
Copper	T6	AR	1	mg/kg	U	005,007
Lead	T6	AR	1	mg/kg	M	001-004,006,008
Lead	T6	AR	1	mg/kg	U	005,007
Mercury	T6	AR	1	mg/kg	M	001-004,006,008
Mercury	T6	AR	1	mg/kg	U	005,007
Nickel	T6	AR	1	mg/kg	M	001-004,006,008
Nickel	T6	AR	1	mg/kg	U	005,007
Selenium	T6	AR	3	mg/kg	M	001-004,006,008
Selenium	T6	AR	3	mg/kg	U	005,007
Vanadium	T6	AR	1	mg/kg	M	001-004,006,008
Vanadium	T6	AR	1	mg/kg	U	005,007
Zinc	T6	AR	1	mg/kg	M	001-004,006,008
Zinc	T6	AR	1	mg/kg	U	005,007
TPH (C5-C6 aliphatic)	T215	AR	10	µg/l	N	009-013
TPH (C6-C8 aliphatic)	T215	AR	10	µg/l	N	009-013
TPH (C8-C10 aliphatic)	T215	AR	10	µg/l	N	009-013
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	N	009-013
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	N	009-013
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	N	009-013
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	N	009-013
TPH (C6-C7 aromatic)	T215	AR	10	µg/l	N	009-013
TPH (C7-C8 aromatic)	T215	AR	10	µg/l	N	009-013

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C8-C10 aromatic)	T215	AR	10	µg/l	N	009-013
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	N	009-013
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	N	009-013
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	N	009-013
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	N	009-013
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	N	001-008
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	N	001-008
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	N	001-008
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	N	001-008
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	N	001-008
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	N	001-008
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	N	001-008
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	N	001-008
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	N	001-008
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	N	001-008
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	N	001-008
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	N	001-008
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	N	001-008
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	N	001-008
VOC Screen	T54	AR	100	µg/kg	N	001-006,008
1,1,1,2-Tetrachloroethane	T54	AR	5	µg/kg	U	001-006,008
1,1,1-Trichloroethane	T54	AR	5	µg/kg	U	001-006,008
1,1,2,2-Tetrachloroethane	T54	AR	5	µg/kg	U	001-006,008
1,1,2-Trichloroethane	T54	AR	5	µg/kg	U	001-006,008
1,1,2-Trichloroethylene	T54	AR	5	µg/kg	U	001-006,008
1,1-Dichloroethane	T54	AR	5	µg/kg	U	001-006,008
1,1-Dichloroethylene	T54	AR	5	µg/kg	U	001-006,008
1,1-Dichloropropene	T54	AR	5	µg/kg	U	001-006,008
1,2,3-Trichloropropane	T54	AR	5	µg/kg	U	001-006,008
1,2,4-Trimethylbenzene	T54	AR	5	µg/kg	U	001-006,008
1,2-dibromoethane	T54	AR	5	µg/kg	U	001-006,008
1,2-Dichlorobenzene	T54	AR	5	µg/kg	U	001-006,008
1,2-Dichloroethane	T54	AR	5	µg/kg	U	001-006,008
1,2-Dichloropropane	T54	AR	5	µg/kg	U	001-006,008
1,3,5-Trimethylbenzene	T54	AR	5	µg/kg	U	001-006,008
1,3-Dichlorobenzene	T54	AR	5	µg/kg	U	001-006,008
1,3-Dichloropropane	T54	AR	5	µg/kg	U	001-006,008
1,4-Dichlorobenzene	T54	AR	5	µg/kg	U	001-006,008
2,2-Dichloropropane	T54	AR	5	µg/kg	U	001-006,008
2-Chlorotoluene	T54	AR	5	µg/kg	U	001-006,008
4-Chlorotoluene	T54	AR	5	µg/kg	U	001-006,008
Benzene	T54	AR	1	µg/kg	U	001-006,008
Bromobenzene	T54	AR	5	µg/kg	U	001-006,008
Bromochloromethane	T54	AR	5	µg/kg	U	001-006,008
Bromodichloromethane	T54	AR	5	µg/kg	U	001-006,008
Bromoform	T54	AR	5	µg/kg	U	001-006,008
Bromomethane	T54	AR	5	µg/kg	U	001-006,008
Carbon tetrachloride	T54	AR	5	µg/kg	U	001-006,008
Chlorobenzene	T54	AR	5	µg/kg	U	001-006,008
Chlorodibromomethane	T54	AR	5	µg/kg	U	001-006,008
Chloroethane	T54	AR	5	µg/kg	U	001-006,008
Chloroform	T54	AR	5	µg/kg	U	001-006,008
Chloromethane	T54	AR	5	µg/kg	U	001-006,008
Cis-1,2-Dichloroethylene	T54	AR	5	µg/kg	U	001-006,008
Cis-1,3-Dichloropropene	T54	AR	5	µg/kg	U	001-006,008
Dibromomethane	T54	AR	5	µg/kg	U	001-006,008
Dichlorodifluoromethane	T54	AR	5	µg/kg	U	001-006,008
Dichloromethane	T54	AR	50	µg/kg	N	001-006,008
EthylBenzene	T54	AR	1	µg/kg	U	001-006,008
Isopropyl benzene	T54	AR	5	µg/kg	U	001-006,008
M/P Xylene	T54	AR	1	µg/kg	U	001-006,008
n-Propylbenzene	T54	AR	5	µg/kg	U	001-006,008
O Xylene	T54	AR	1	µg/kg	U	001-006,008
p-Isopropyltoluene	T54	AR	5	µg/kg	U	001-006,008
S-Butylbenzene	T54	AR	5	µg/kg	U	001-006,008
Styrene	T54	AR	5	µg/kg	U	001-006,008
T-Butylbenzene	T54	AR	5	µg/kg	U	001-006,008
Tetrachloroethene	T54	AR	5	µg/kg	U	001-006,008
Toluene	T54	AR	1	µg/kg	U	001-006,008
Trans-1,2-Dichloroethene	T54	AR	5	µg/kg	U	001-006,008

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Trans-1,3-Dichloropropene	T54	AR	5	µg/kg	U	001-006,008
Trichlorofluoromethane	T54	AR	5	µg/kg	U	001-006,008
Vinyl chloride	T54	AR	5	µg/kg	U	001-006,008
VOC Screen (Extra Peaks)	T54	AR	10	µg/l	N	009-013
Dichlorodifluoromethane	T54	AR	1	µg/l	U	009-013
Chloromethane	T54	AR	1	µg/l	U	009-013
Vinyl chloride	T54	AR	1	µg/l	U	009-013
Bromomethane	T54	AR	1	µg/l	U	009-013
Chloroethane	T54	AR	1	µg/l	U	009-013
Trichlorofluoromethane	T54	AR	1	µg/l	U	009-013
1,1-Dichloroethylene	T54	AR	1	µg/l	U	009-013
Dichloromethane	T54	AR	50	µg/l	N	009-013
Trans-1,2-Dichloroethene	T54	AR	1	µg/l	U	009-013
1,1-Dichloroethane	T54	AR	1	µg/l	U	009-013
Cis-1,2-Dichloroethylene	T54	AR	1	µg/l	U	009-013
2,2-Dichloropropane	T54	AR	1	µg/l	U	009-013
Chloroform	T54	AR	1	µg/l	U	009-013
Bromochloromethane	T54	AR	1	µg/l	U	009-013
1,1,1-Trichloroethane	T54	AR	1	µg/l	U	009-013
1,1-Dichloropropene	T54	AR	1	µg/l	U	009-013
Carbon tetrachloride	T54	AR	1	µg/l	U	009-013
1,2-Dichloroethane	T54	AR	1	µg/l	U	009-013
Benzene	T54	AR	1	µg/l	U	009-013
1,2-Dichloropropane	T54	AR	1	µg/l	U	009-013
1,1,2-Trichloroethylene	T54	AR	1	µg/l	U	009-013
Bromodichloromethane	T54	AR	1	µg/l	U	009-013
Dibromomethane	T54	AR	1	µg/l	U	009-013
Cis-1,3-Dichloropropene	T54	AR	1	µg/l	U	009-013
Toluene	T54	AR	1	µg/l	U	009-013
Trans-1,3-Dichloropropene	T54	AR	1	µg/l	U	009-013
1,1,2-Trichloroethane	T54	AR	1	µg/l	U	009-013
1,3-Dichloropropane	T54	AR	1	µg/l	U	009-013
Tetrachloroethene	T54	AR	1	µg/l	U	009-013
Chlorodibromomethane	T54	AR	1	µg/l	U	009-013
1,2-dibromoethane	T54	AR	1	µg/l	U	009-013
Chlorobenzene	T54	AR	1	µg/l	U	009-013
1,1,1,2-Tetrachloroethane	T54	AR	1	µg/l	U	009-013
Ethylbenzene	T54	AR	1	µg/l	U	009-013
M/P Xylene	T54	AR	1	µg/l	U	009-013
O Xylene	T54	AR	1	µg/l	U	009-013
Styrene	T54	AR	1	µg/l	U	009-013
Bromoform	T54	AR	1	µg/l	U	009-013
Isopropyl benzene	T54	AR	1	µg/l	U	009-013
1,1,2,2-Tetrachloroethane	T54	AR	1	µg/l	U	009-013
1,2,3-Trichloropropane	T54	AR	1	µg/l	U	009-013
n-Propylbenzene	T54	AR	1	µg/l	U	009-013
Bromobenzene	T54	AR	1	µg/l	U	009-013
1,3,5-Trimethylbenzene	T54	AR	1	µg/l	U	009-013
T-Butylbenzene	T54	AR	1	µg/l	U	009-013
1,2,4-Trimethylbenzene	T54	AR	1	µg/l	U	009-013
S-Butylbenzene	T54	AR	1	µg/l	U	009-013
p-Isopropyltoluene	T54	AR	1	µg/l	U	009-013
2-Chlorotoluene	T54	AR	1	µg/l	U	009-013
4-Chlorotoluene	T54	AR	1	µg/l	U	009-013
1,3-Dichlorobenzene	T54	AR	1	µg/l	U	009-013
1,4-Dichlorobenzene	T54	AR	1	µg/l	U	009-013
1,2-Dichlorobenzene	T54	AR	1	µg/l	U	009-013