



ENSR International Ltd.

PHASE I AND PHASE II ENVIRONMENTAL
SITE ASSESSMENT
TETROSYL, BEVIS GREEN WORKS
WALMERSLEY, BURY

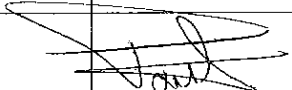
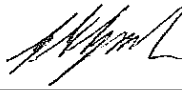


PHASE I AND PHASE II ENVIRONMENTAL
SITE ASSESSMENT
TETROSYL, BEVIS GREEN WORKS
WALMERSLEY, BURY

REPORT NO : 10468-1(01)

Client : Tetrosyl Limited
Walmersley
Bury
Lancashire
BL9 6RE

DOCUMENT ISSUE STATUS

Report Issue	Final		
Reference Number	10468-1 (01)		
<i>Title</i>	<i>Name</i>	<i>Signature</i>	<i>Date</i>
Author	P Walton P Marshall		January 28, 2003
Project Manager	P Walton		January 28, 2003
Technical Reviewer	G McGuicken		January 28, 2003

This report is not to be used for contractual or engineering purposes unless the above is signed where indicated by both the author of the report, the project manager and the technical reviewer of the report and the report is designated "FINAL".

TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	LOCATION AND TOPOGRAPHY OF THE SITE	2
3.	GEOLOGY, HYDROLOGY, AND HYDROGEOLOGY OF THE SITE	4
3.1	GEOLOGY	4
3.2	HYDROLOGY	5
3.3	HYDROGEOLOGY	5
4.	PHASE I ENVIRONMENTAL SITE ASSESSMENT	7
4.1	HISTORY OF SITE AND SURROUNDING AREA	7
4.2	REVIEW OF PREVIOUS INVESTIGATIONS	9
4.3	EXTERNAL ENQUIRIES	10
4.3.1	Environment Agency	10
4.3.2	Bury Metro Environmental Services	11
5.	SITE WALKOVER	13
6.	SITE WORK	15
6.1	TRIAL PITS	15
6.2	PROBEHOLES	15
6.3	BOREHOLES	15
6.4	MONITORING INSTALLATIONS	16
7.	MONITORING	17
8.	LABORATORY TESTING	18
8.1	GEOTECHNICAL TESTING	18
8.2	CONTAMINATION ANALYSES	18

9.	GROUND CONDITIONS	20
9.1	AREAS OF THE SITE	20
9.2	SUMMARY OF AREAS WITH EVIDENCE OF HYDROCARBON IMPACT	25
10.	ASSESSMENT OF MINING	26
11.	FRAMEWORK FOR SITE DEVELOPMENT	27
11.1	FOUNDATIONS ON NATURAL SOILS	27
11.2	FOUNDATIONS ON MADE GROUND	27
11.3	OTHER COMMENTS ON FOUNDATIONS AND INFRASTRUCTURE DESIGN	28
12.	DEVELOPMENT CONSTRAINTS	30
12.1	EXISTING RESERVOIR	30
12.2	CULVERTED WATER COURSE	30
12.3	BACKFILLED RESERVOIRS AND QUARRIES	31
12.4	OLD ADITS AND AIR SHAFT	31
13.	CONTAMINATION ASSESSMENT	32
13.1	SUMMARY OF CONTAMINATION ASSESSMENT	32
13.2	SOILS ANALYSIS	36
13.2.1	Contamination Assessment - Areas of Potential Concern	36
13.2.2	Contamination Assessment - General Site Areas	43
13.2.3	Asbestos Analyses	43
13.3	GROUND GAS	44
13.4	GROUNDWATER ANALYSIS	45
14.	CONTAMINATION RISK ASSESSMENT	47
14.1	CONTAMINATION HAZARD	47
14.2	SENSITIVE RECEPTORS	50

14.3	MIGRATION PATHWAYS	50
14.4	ASSESSMENT OF RISK	51
15.	REMEDIATION STRATEGY	54
15.1	MATERIAL EXCAVATED FROM THE SITE	56
16.	CHEMICAL ATTACK ON BURIED CONCRETE	58
17.	REFERENCES	59

LIST OF TABLES

Table 1A	Results of Gas Monitoring 01/11/02
Table 1B	Results of Gas Monitoring 05/11/02
Table 1C	Results of Gas Monitoring 12/11/02
Table 1D	Results of Gas Monitoring 20/11/02
Table 1E	Results of Laboratory Analysis on Gas Sample
Table 2	Results of Analyses on Soil Samples
Table 3	Results of Groundwater Analysis
Table 4	Results of Leachability Analyses on Soil Samples
Table 5	Results of Plasticity Index Analysis
Table 6	Results of Loss on Ignition Analysis
Table 7	Results of Asbestos Analysis

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Site Plan Showing Historically Filled Areas and Thickness of Madeground
Figure 3	Investigation Location Plan
Figure 4	Areas of Potential Concern
Figure 5	General Site Areas Identification

LIST OF APPENDICES

Appendix A	Service Constraints
Appendix B	Regulatory Correspondence
Appendix C	Trial Pit, Probehole and Borehole Records
Appendix D	Laboratory Analytical Certificates

1. INTRODUCTION

Tetrosyl Limited (Tetrosyl) propose to vacate their Bevis Green, Walmersley, site (subject property) and offer the site for sale as a proposed development site. The existing operations currently carried out at the site will be relocated to a new facility. The subject property is owned by Tetrosyl who are engaged in blending of bulk chemicals for the manufacture of car-care products. Solvent recovery is also undertaken at the site under an IPC authorisation. During the period of this investigation the Tetrosyl operations were ongoing. Historical uses of the property have included a cotton dye works and print works.

ENSR International Limited was commissioned by Tetrosyl to carry out a Phase I and Phase II Environmental site Assessment (ESA). Specifically the Phase II investigation was undertaken to provide information on ground conditions for preliminary foundation and infrastructure design and to comment on ground and groundwater contamination and ground gas emissions, if present.

This report contains the results of the Phase I and Phase II ESA which comprised a desk study, contact with the regulatory authorities, site walkover survey, the excavation of trial pits, sinking of probeholes & boreholes, installation of gas and groundwater monitoring wells, collection of soil and groundwater samples, laboratory testing of soil groundwater and gas samples, and on-site monitoring for landfill gas.

The comments given in this ENSR report and the opinions expressed are based on the ground conditions encountered during the site work; the results of tests made in the field and in the laboratory, and on other information provided. There may be, however, conditions pertaining to the site which have not been disclosed by the investigation and which therefore could not be taken into account. In particular it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness of made ground may be greater than found in the investigation. Also groundwater levels and ground gas conditions vary due to seasonal or other effects and may at times vary significantly from those reported.

This report is subject to the ENSR International Limited service constraints given in Appendix A.

2. LOCATION AND TOPOGRAPHY OF THE SITE

The property is located at National Grid reference SD 810 140. A site location map is presented as Figure 1.

The site occupies approximately 25.18 acres of which approximately 4.42 acres is designated as green belt land. The property forms an irregular rectangular shape with the longest axis north to south. The site level falls from north to south and west to east.

The area of designated green belt is located in the northern sector of the site. This land is comprised of undeveloped grassland, which is periodically cut by a local farmer. The grassland slopes to the east towards a small brook (a tributary of Pigs Lee Brook) and wooded valley. A section of the brook and wooded valley is located within the Tetrosyl property boundary. The brook flows through the property and into a holding reservoir before discharging via an overflow weir and spillway. The Brook is then culverted through the site and emerges to the south of the site.

To the west of the green belt land is an open area used by Tetrosyl for trailer and truck parking and general storage. The ground surface is level and has been surfaced with road planings.

To the south of the trailer parking area there are two warehouses. The northern warehouse has been constructed on a level within a cut, which has exposed the underlying solid strata. A bedrock exposure is visible to the northeast of the building. The excavated materials from the cut were reportedly used to infill a former reservoir located on the current car park area in the western sector of the site.

To the west of the two warehouses adjacent to the property boundary there is a landscaped area comprising trees, shrubs and a grassed area. The trees form a visual barrier from the adjacent road and residential properties.

To the east of the northern warehouse the land rises above the cut to an area of scrubland and wood at the location of a former quarry. The quarry has been historically infilled. At the east end of the location of the former quarry, there is a concrete surfaced drum and intermediate bulk container (IBC) storage area.

On the eastern sector of the site there is a reservoir and narrow woodland strip along the banks of the brook and extending to the eastern boundary of the property. The reservoir was historically created by damming the small brook with an east-west aligned retaining wall. The reservoir discharges via an overflow weir on the southwestern side

of the reservoir. At the base of the reservoir retaining wall there are Tetrosyl storage and production buildings which were formerly in use as a cotton and dye works.

To the east of the reservoir there is a tank farm area for storage of hydrocarbon solvents. To the south of the tank farm there is a solvent recovery plant with associated underground storage tanks (USTs) and above ground storage tanks (ASTs).

To the south and southwest of the reservoir are the main Tetrosyl production buildings, which comprise blending filling and packing of car care products.

The site is bounded to the west by a public road (Walmersley Old Road) and residential and commercial properties. A public road (Bentley Lane) and residential properties to the north; agricultural land and farm buildings to the east; and a residential properties to the south. The M66 motorway is located adjacent to the northeast corner of the site.

3. GEOLOGY, HYDROLOGY, AND HYDROGEOLOGY OF THE SITE

3.1 GEOLOGY

Published records for the area ⁽¹⁾ indicate the geology in the vicinity of the site to comprise Glacial Till (Boulder Clay) deposits overlying Haslingden Flags of the Millstone Grit Series (Upper Carboniferous). The strata are recorded as dipping in a southeasterly direction.

The six-inch BGS geological map records a sub crop of the 'Six Inch Mine' (coal seam) adjacent to and crossing the southeastern boundary of the property. The sub crop is recorded as running parallel to the eastern boundary of the property. There is one air shaft marked immediately to the northeast of the reservoir. There are two faults crossing the property from the north west to south east. The faults converge at an acute angle to the east of the property boundary. The northern most fault downthrows to the north and the southern fault down throws to the south.

A British Coal (now the Coal Authority) report dated October 17, 2002, reported the following information in connection with the subject property:

- One seam of coal has been mined at shallow depth within 20m of the site, with the last extraction recorded as being in 1877.
- Records show that surface strata in the area could be coal bearing and the possibility of unrecorded mining activities cannot be discounted.
- There are believed to be two adits present in the southeastern corner of the site and one coalmine shaft (marked on maps as an 'Air Shaft') in the northeast of the site. There are no records of the measures that were taken to fill in the shaft or adits.

The Coal Authority were further contacted to obtain abandoned mine plans for the property. One abandoned mine plan was obtained for Lumn Mills Colliery, Sand Rock Mine (Abandonment Plan No. 818). The plan details two adits located on the properties eastern boundary connecting to coal workings to the east of the property. The Coal Seam is recorded as '1ft 9in thick'. Notes on the map state that 'This is a shallow working in the Rough Rock'. There are no specific details of the actual depth of the workings. No further information was obtained on the air shaft.

3.2 HYDROLOGY

In the northern end of the property there is a man-made reservoir covering an area of approximately 1.25ha. The reservoir was historically created by damming the tributary of Pigs Lee Brook and flooding part of the former valley.

The brook rises from a point approximately 2km north of the property and flows through four connected reservoirs before entering the northern boundary of the property. The brook then flows into the property's reservoir and ultimately discharges via a spillway to an engineered channel and spillway, which is initially open and then culverted under the building structures. The stream continues in a southerly and then southeasterly direction to join Pigs Lee Brook approximately 450m southwest of the southern property boundary. Pigs Lee Brook joins the southerly flowing River Irwell approximately 2km southwest of the property.

There is a land drain originating on land to the north of the property which flows north to south through the property across the Green Belt land, to the east of the tank farm and is believed to discharge to the reservoir on the property.

A spring was formerly located on the hardstanding area in the north of the property. This spring has been connected by means of a subsurface drain to the surface water drainage system on the Tetrosyl property.

The southerly flowing Pigs Lee Brook flows approximately 100m to east of the property through two small reservoirs located 100m east and 300m south of the property.

Surface infiltration of rainwater will occur in areas of soft landscaping and unsurfaced ground. Rainwater from roofs and hardstanding surfaces ultimately flows to the surface water drainage system which discharges off site to the south. Movement of shallow perched water in fill materials or near surface permeable soils is likely to be to the south - southeast in direction of the main drainage in the area.

3.3 HYDROGEOLOGY

The Environment Agency Groundwater Vulnerability Map ⁽²⁾ shows the Haslingden Flags underlying the property to be classified as a Minor Aquifer. Minor Aquifers are considered to be variably permeable deposits, which seldom produce large quantities of water but may be important for local supplies. The overlying soils are classified as having high leaching potential (a worst case vulnerability classification designated for urban areas where there is a lack of geological data). In areas where there is a covering of Glacial Till (Boulder Clay) over the solid strata there will be some restriction to vertical infiltration resulting from the lower permeability deposits.

The nearest groundwater abstraction point is located approximately 830m to the northeast of the property (i.e. up gradient of groundwater flow). The water use is described as a private water undertaking for raw water supply. There are a number of boreholes located to the southeast and southwest (down gradient) of the property at distances in excess of 1km. The nearest down gradient borehole is located at approximately 1080m southwest with water use for agricultural and general use.

4. PHASE I ENVIRONMENTAL SITE ASSESSMENT

A Phase I Environmental Site Assessment (ESA) was undertaken for the subject property. This included a review of the previous investigations undertaken on the property, enquiries to relevant statutory authorities and information suppliers, and interviews with facility personnel with knowledge of current and historical operations of the Tetrosyl property.

4.1 HISTORY OF SITE AND SURROUNDING AREA

The history of the property and surrounding area was reviewed from historical Ordnance Survey plans reproduced in the Envirocheck report⁽¹⁾ and information provided by facility personnel:

The earliest Ordnance Survey map of 1851 shows the subject property to be occupied by several buildings in the south of the property annotated as 'Bently Mill (cotton)' and 'Lumn Mill'. A chimney is indicated in the centre of the site. Two reservoirs are shown on the property, one at the northeast of the property (still present) and another smaller one at the southwest of the site (now infilled). The property is surrounded by open farmland and small villages, the closest being Bevis Green to the southwest of the property.

The map of 1893 shows extensive works buildings on the property identified as 'Lumn Mills (Cotton and Logwood Dyes)' in the southeastern sector of the site. The two reservoirs dating from 1851 are still present as well as two other small reservoirs; one is indicated amongst the buildings in the southeast of the site and one adjacent to the property boundary in the southeastern sector. A 'well' is indicated adjacent to the southwestern corner of the property at Bevis Green, and a further well some 100m to the south of the property. An 'Air Shaft' is indicated in the north of the property, 25m to the west of the northwestern edge of the northern reservoir. An 'old shaft' is indicated 200m southeast of the property boundary. A reservoir is indicated 200m to the east of the property boundary on Pigs Lee Brook.

The map of 1910 shows the Lumn Mills as 'disused'. The only other change on the property is infilling and building development on the reservoir shown on the 1893 map in the southeastern sector.

The map of 1930 shows the site to be occupied by Bevis Green Print Works. Some changes have been made to the buildings on the site since 1910 including the removal of the reservoir that was located amongst the buildings in the southeast. A quarry is shown in the centre of the site approximately 50m west of

the northern most reservoir. A spoil heap is shown between the quarry and the reservoir. Disused sewage tanks (Bury Corporation) are shown adjacent to Mill Road approximately 50m west of the southern property boundary. Residential development is shown approximately 50m to the west of the property boundary.

The map of 1960 shows the quarry noted on the 1930 map to be disused and in use as a 'pond'. The disused sewage tanks to the south of the property are no longer shown. Further residential development is shown to the west and northwest of the property.

The map of 1971 (only covering the southwestern corner of the site) shows the water in the reservoir at the southwest of the site to be at a lower level than the map of 1960 (the steep banks of the reservoir are detailed). A 'refuse tip' is indicated around the east and south of the disused quarry (annotated as pond) in the north of the site. The works buildings are annotated as 'Car Accessories Factory', which refers to the Tetrosyl car-care production operations. Further residential development is indicated a few metres to the south of the site. Residential garages are shown off Mill Lane adjacent to the southwestern corner of the site.

The map of 1984 shows the reservoir in the southwest of the site has been infilled. Two new buildings (Tetrosyl warehouses) are shown to the north of the former reservoir location. According to Tetrosyl personnel a cut and fill exercise was carried out prior to the construction of the two new buildings in the 1970s. Material excavated from the area of the new buildings was used to infill the reservoir. There is currently a car park and office buildings at the location of the former reservoir. The disused quarry in the north of the site is also no longer detailed. A concrete surfaced drum storage area is currently located in the position of part of the former quarry. The M66 motorway is shown on an embankment adjacent to the northeastern boundary of the property. The reservoir located 200m to west of the property is shown as disused and empty and a new covered reservoir is shown 50m to the south of the disused one.

The map of 1999 shows land to have been infilled at two locations along the northwestern and southern banks of the existing reservoir in the northwest of the property. The map of 1987, which shows the northern tip of this reservoir, appears to show that the northwestern bank had been infilled at this time.

Facility personnel stated that Tetrosyl have occupied the subject property since the mid 1960s. Tetrosyl have always undertaken mixing operations for production of car care products.

4.2 REVIEW OF PREVIOUS INVESTIGATIONS

Three previous investigation reports were provided for review by ENSR, as follows:

- Highway & Foundation Surveys Ltd., Site Investigation Report, Proposed Extensions to Tetrosyl Ltd. Bury, August 1976;
- Sub Soil Surveys Ltd., Report on Ground Investigation at Site of Proposed Storage Tanks, at Tetrosyl Ltd., Old Walmersley Road, Bury, September 1981;
- Sub Soil Surveys Ltd., Results of Ground Investigation at Tetrosyl Ltd. Bevis Green Works, Bury, January 1996.

A summary of these reports is detailed below:

1976 Report

This report details a geotechnical investigation undertaken at the location of the tank farm between the former quarry and reservoir. A total of six boreholes were drilled to a maximum depth of 6.2m. Two boreholes were drilled in the backfilled quarry. Identified materials in the quarry area were predominantly ash and brick with soil, clay and sandstone. In one borehole (BH1) the base of the infilled material was not proven to a depth of 6.2m. Groundwater was encountered in the quarry area at 4.0m b.g.l. The general sequence of strata was as follows:

- Topsoil
- Clay
- Weathered sandstone

Chemical analysis of water samples in the quarry area for sulphate and pH determined concentrations of 261-288 mg/l, and pH 6.6 – 6.8. For soil samples the percentage concentration of sulphate was described as 'no trace'. Sulphate resisting cement was recommended for development in the quarry area.

1981 Report

This report details a geotechnical investigation at the site of the current tank farm. The investigation was undertaken prior to construction of the tank farm and was to provide geotechnical data. Four cable percussive boreholes were drilled to depths ranging from 3.5m to 4.8m. Encountered strata comprised:

- Made ground comprising sandy clay, wood, brick and peat
- Glacial clay with inclusions of stone coal and shale
- Sandstone

There were no recorded groundwater entries in the boreholes during drilling. Chemical analysis was restricted to sulphate which ranged from 0.034 – 0.042%.

1996 Report

This report details the borehole logs and test data at the site of the current reception and office building. Three boreholes were drilled to depths ranging from 7.75m to 11.18m b.g.l. Encountered strata comprised the following general sequence:

- Madeground comprising brick, clay, sand, and stone,
- Clay and sandy clay
- Mudstone and sandstone

Groundwater was observed in one borehole to a depth of 3.50m, the other boreholes were dry during drilling.

Chemical analysis was restricted to sulphate and pH. The sulphate concentrations ranged from 0.06 g/l and 0.92 g/l. pH ranged from 7.7 to 8.5.

4.3 EXTERNAL ENQUIRIES

Written and verbal enquiries were made to the Environment Agency and Environmental Health Department of Bury Metro (Local Authority). The replies received are summarised

4.3.1 Environment Agency

The Environment Agency provided information from the public record in a letter dated December 5, 2002. A summary of the information provided is detailed below. A copy of the correspondence is presented in Appendix B.

- There are no surface water bodies with general quality assessment (GQA) data located within a 1km radius of the site;
- There are no current Waste Management Licence holders within 250m of the site;
- There is one closed landfill. This is the former sewage tanks located to the south of the site. The infilled waste is believed to be ash;
- Pigs Lee Brook Tributary which flows through the site is designated as a 'Main River and is subject to Byelaw Control. No works may take place within 8 metres from the bank top of the watercourse without prior consent of the EA. Consent is also required under the Water Resources Act 1991, for any works on

over or within the channel of the watercourse, including construction of surface water outfalls;

- The Agency has no records of the property being subject to fluvial flooding in the past. However, due to its proximity to the watercourse, the possibility of flooding in the future cannot be entirely dismissed;
- The riparian landowner is responsible for the maintenance and repair of the watercourse bed, banks, and any structure including culverts and retaining walls.
- The EA has no knowledge of any defect or want of repair in the watercourse bed, banks, or structures including culverts and retaining walls. Inspection is however, recommended;
- The EA has no details regarding the route, depth or structural condition of the culvert. Any prospector will need to ascertain this;
- Proposed layouts must ensure access is available to the open and culverted sections and a minimum of 8 metres on each side of the watercourse must be provided. Any proposals to open up sections of the culvert would be welcomed by the EA subject to design. If culverted sections remain in the layouts proposed, an overland flow route must be considered such that properties would not be flooded should blockage or collapse occur;
- The EA would raise planning objection to any Planning Applications made that did not address the above and also recommend that a flood risk assessment is carried out in accordance with PPG25;
- The site is not currently within a defined groundwater source protection zone;
- The EA has no details of boreholes or wells within the property;
- There are no Integrated Pollution Control (IPC) or Radioactive Substances (RAS) sites within 250m of the site;
- The EA has no knowledge of prosecutions or outstanding notices affecting the property.

4.3.2 Bury Metro Environmental Services

The Environmental Services dept of Bury Metro were requested to provide information held on the public record in connection with the subject property. A summary of the information received is detailed below. A copy of the correspondence is presented in Appendix B.

- There is one identified former landfill site located approximately 50m southwest of the subject property. The landfill is comprised of infilled former sewage tanks. The site was operated pre-licensing and consequently little information is available on waste types deposited at the site. A spike survey was undertaken which determined no concentrations of methane and up to 10% carbon dioxide.
- Bury Metro are not aware of any pollution incidents at the property;

- There are no recorded private water supply abstractions within 250m of the property;
- There are no recorded hazardous installations or Part A, Part B, IPC or IPPC authorisations within 250m of the property;
- The Council undertook a review of historical plans, to determine industrial landuse. A reproduction of this information is detailed in Appendix B.

5. SITE WALKOVER

Following the desk study review a site walkover survey was carried out by ENSR to determine Areas of Potential Concern (APCs) in relation to potential contamination at the Property. APCs are identified areas where current or historical land use may have resulted in ground or groundwater contamination.

A summary of these areas is presented in Table 5.1 below.

TABLE 5.1: Identified Areas of Potential Concern

APC Reference	Description
1	Underground storage tanks (USTs) containing white spirit and mono ethylene glycol (MEG). Unused USTs previously contained methanol
2	Antifreeze mixing area including three ASTs
3	Tetrosyl maintenance workshop and former Dyeworks mechanics shop
4	Raw material drum compound
5	Tetrosyl vehicle maintenance shed. The building was constructed on an area of ash fill
6	Fuel oil (diesel) AST supplying fuel for the vehicle maintenance shed
7	Diesel AST used for vehicle filling
8	Kerosene AST
9	Fuel (heating oil ASTs)
10	ASTs containing methylene chloride, sodium silicate, kerosene, and white spirit

TABLE 5.1 (Continued)

APC Reference	Description
11	Electrical transformer
12	Sprinkler pump and diesel AST
13	Heating Oil ASTs
14	Former Tetrosyl cap spraying room
15	AST not in use (former contents not known)
16	Bitumen AST
17	Tetrosyl resin room and location of former reservoir for the printworks.
18	Infilled former reservoir
19	Former USTs infilled with concrete
20	Solvent drum filling area
21	Solvent recovery plant
22	Drum crushing plant
23	Solvent tank farm
24	Waste sludge reclamation plant
25	Former quarry and landfill
26	Heating oil AST
27	Open area surfaced with road planings
28	Diesel AST
29	Area adjacent to off-site infilled sewage tanks, Mill Road car park
30	Former reservoir (north of maintenance shed)
31	Infilled ground to south of reservoir
32	Infilled ground to east of reservoir

The APCs detailed above were investigated during the Phase II works detailed in the following sections.

6. SITE WORK

The intrusive site investigation work was carried out during the period of 23 to 29 October 2002. It included the excavation of trial pits, sinking of probeholes and boreholes, and installation of monitoring wells. All works were supervised by an engineer from ENSR International Limited.

The locations of the trial pits, probeholes and boreholes are indicated on the site plan, Figure 2. Locations of the exploration points include the Areas of potential Concern listed in Table 5.1 above, and other general areas of the site.

6.1 TRIAL PITS

Eleven trial pits (referenced TP1 to TP11 inclusive) were excavated by mechanical means on 29 October 2002. Representative soil samples were taken and returned to the laboratory for analysis. The descriptions of the strata encountered together with comments on groundwater conditions and pit stability are given in the trial pit records presented in Appendix C. In view of the on going use of the site, trial pits were only excavated in areas, which would not cause disruption to site operations. Trial pits were therefore only excavated on the unsurfaced ground located in the northern and southern sectors of the property.

6.2 PROBEHOLES

Forty-five probeholes (referenced PH1 to PH45 inclusive) were sunk by percussive means using window-sampling methods between 23 and 28 October 2002. The probeholes were commenced at a diameter of 80mm and were progressively reduced to a minimum diameter of 40mm at 3m depth. Representative samples were taken from the window samplers and returned to the laboratory for analysis. The descriptions of the strata encountered together with comments on groundwater conditions are given in the probehole records presented in Appendix C.

6.3 BOREHOLES

Eleven boreholes (referenced BH1 to BH11 inclusive) were sunk by light cable percussive means between 23 and 29 October 2002. Obstructions were encountered at shallow depth during the boring for two of the boreholes (BH-7 and BH-8), which had to be abandoned. The depths of the boreholes, descriptions of the strata encountered and comments on groundwater conditions are given in the borehole records presented in Appendix C.

Representative samples were taken throughout the full depth of boring. A representative selection of these samples were returned to the laboratory for examination and testing.

Standard penetration tests (SPTs) were carried out in granular soils to assess the relative density of the natural soils and made ground. The values of penetration resistance (N values) for these tests are given in the borehole records.

6.4 MONITORING INSTALLATIONS

Perforated standpipes (52mm diameter and 35mm diameter respectively) were installed in nine boreholes and eight probeholes to enable monitoring of groundwater levels and gas flow rates, pressures and concentrations.

The standpipes were installed in the boreholes and probeholes and surrounded with sand/pea gravel and sealed at the surface with bentonite. Valves were fixed to the top of the installations, which were protected with lockable covers. Details of the installations are given on the respective records presented in Appendix C.

7. MONITORING

Four visits were made to site on 01, 05, 12 and 20 November 2002 to monitor the standpipes installed in the probeholes and boreholes.

Concentrations of methane, carbon dioxide and oxygen were recorded using an Infra Red Gas Analyser. Both peak and steady concentrations were recorded along with atmospheric pressure. Flow rates of gas from the installations were recorded using a Gas Data GF60 mass flow balance transducer.

On two occasions hydrocarbon vapour concentrations were also recorded using a Mini-Rae Photo-Ionisation-Detector.

The borehole and probehole installations in the solvent recovery area and near vicinity were not monitored since it was required that all equipment used in this area was intrinsically safe.

The results of the gas monitoring are given in Table 1 (a-d).

Water levels in the standpipes were recorded using an electronic dip meter. These results are also given in Table 1 (a-d).

Groundwater samples were taken from six boreholes and one probehole, which yielded sufficient sample for analysis. Samples were returned to the laboratory for analysis.

8. LABORATORY TESTING

8.1 GEOTECHNICAL TESTING

The natural moisture contents and liquid and plastic limits of nine samples of the cohesive soils were determined. The results of the analysis are included in Table 5.

Samples were scheduled for determination of water-soluble sulphate content and pH values. The results of these analyses are given in Table 2.

8.2 CONTAMINATION ANALYSES

Total petroleum hydrocarbons (TPH) and aromatic hydrocarbons (BTEX - benzene, toluene, ethylbenzene and xylene) were determined for fourteen soil samples. Volatile organic compounds (VOCs) were determined for seventeen soil samples. Polychlorinated biphenyl (PCB) analysis was carried out on one soil sample.

Chemical analyses was also carried out on seventeen representative samples of the made ground and natural soils for a range of contaminants based on Guidance Note 59/83 produced by the Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL). The following parameters were determined in this analysis suite:

pH, total sulphate, total metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead, selenium and zinc) solvent extractable matter (SEM), total phenols, total cyanide, sulphide and water soluble boron. This is referred to as the 'general suite' throughout the report.

The results of all soils analysis are presented in Table 2.

Leachability tests were undertaken on eight selected soil samples and the concentrations determined for the general suite of analysis which comprised the following:

pH, total sulphate, total metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead, selenium and zinc) solvent extractable matter (SEM), total phenols, total cyanide, sulphide and water soluble boron.

The results of these leachability tests are included in Table 4.

Seven groundwater samples were analysed from the monitoring well points located on the property. Six samples were analysed for TPH, BTEX and VOCs. Three samples were analysed for the general analysis suite. The results of these analyses are included in Table 3.

Four soil samples were tested for loss on ignition and the results are presented in Table 6.

Asbestos analysis was undertaken on five made ground samples to determine the concentration and type of any asbestos that may be present. The results of these analyses are presented in Table 7.

During the monitoring a sample of gas was removed from borehole 10. The results of this analysis is included in Table 1e.

9. GROUND CONDITIONS

The ground conditions described are based on data from the 11 trial pits, 45 probeholes and 11 boreholes drilled under the supervision of an ENSR geo-environmental engineer.

Buildings, concrete slabs and areas of tarmac hardstanding cover a large proportion of the site area. Made ground was encountered to depths varying between 0.16m (PH3) and 11.00m (BH9).

9.1 AREAS OF THE SITE

The site has been divided into ten areas to assist the discussion of ground conditions (refer to Figure 5 for the notation of each area).

1. Top of Site – Green Belt Land and Trailer Parking area at Northern End of the Site

Trial pits in the Green belt land (grassed field) encountered topsoil to 0.20m over firm to stiff sandy silty clay, with some sandstone cobbles at depth. There was no made ground encountered in this area.

In the trailer parking area made ground was encountered to depths of between 0.45m and 0.60m and comprised loose to moderately compact gravel over firm to stiff sandy clay. The underlying natural material comprised weathered sandstone or stiff sandy clay with some sandstone cobbles and boulders at depth.

Groundwater was generally not encountered over this part of the site due to the shallow depths of excavation, however land drains were encountered within trial pits TP-4 and TP-5 at depths of 0.90m and 0.70m respectively. The drain in TP-4 did not contain water but the one in TP-6 did and moderate water entries were recorded.

There was no visual or olfactory evidence of hydrocarbons or solvents in this part of the site.

2. Warehouses and Landscaped Grassed Area

In this area the thickness of made ground varied between 0.23m (PH-19) and 1.20m (PH23). The soil profile comprised grass, concrete or tarmac over moderately compact sandstone gravel, and in places underlain by silty clay or reworked silty clay. The fill material was generally underlain by weathered sandstone.

Groundwater entries were noted within the natural clay or sandstone between depths of 0.23m – 0.43m (PH19) and 2.00m – 3.00m (PH25).

There was no visual or olfactory evidence of hydrocarbons or solvents in this area.

3. Solvent Recovery Area

Significant thicknesses (greater than 3.00m) of made ground were encountered in the position of the old quarry (PH28, PH29 and PH36) in the solvent recovery area.

The made ground was variable in nature and comprised clayey silt or clayey sand with variable amounts of coal, sandstone, brick gravel and timber fragments, over loose ash and clinker (PH28 and PH29) or moderately compact sand over loose gravel and cobbles of brick and sandstone (PH36). The made ground was underlain by soft clayey silt (PH36) and loose silty sand with timber fragments (PH28) or sandstone gravel and timber fragments (PH29). The depth of made ground in this area was not proven in all areas.

The depth of made ground over the rest of the solvent recovery area generally varied between 0.30m (PH34) and 0.80m (PH30) and generally comprised concrete (0.20m thick) over a loose limestone gravel in a sandy matrix. Loose brick in a black ash matrix was encountered in one location (PH34). The fill material was underlain by weathered sandstone or soft to firm clayey silt over weathered sandstone.

Groundwater entries were noted in the made ground in probeholes PH28 (3.20m), PH29 (3.00m) and PH36 (1.30m) (the area of the old quarry).

Hydrocarbon and solvent odours were noted in borehole BH6 (from 0m – 1.45m) and probeholes PH34 (0.30m) and PH37 (1.50m – 2.00m).

4. Reservoir Area

Two areas on the edge of the reservoir have been historically filled for land reclamation purposes. The land has historically been used by Tetrosyl for the parking of road tanker vehicles. Trial pit TP9 was located close to the area of fill on the northwestern bank of the reservoir. Made ground was encountered to (2.90m) and comprised firm silty clay with a little brick and wood fragments, roots and fibrous vegetation. The base of the madeground was not proven in this area.

Trial pit TP6 and borehole BH-5 were located within the filled area at the south end of the reservoir. In this area made ground was encountered to a depth of greater than

4.50m and comprised loose sand and gravel with concrete boulders and fragments of sandstone and brick.

Rapid groundwater entries were encountered in the made ground at 0.60m and 1.00m in trial pit TP-6 and borehole BH5, respectively. This is a result of the near vicinity of the reservoir and hydraulic connection with groundwater.

The water and made ground encountered in trial pit TP6 appeared to have a hydrocarbon sheen and there was an associated hydrocarbon odour.

5. Car Park Area (Former Reservoir)

Made ground in this area was encountered to a depth of 4.00m (BH2 and BH3) and comprised tarmac over moderately compact sand with varying amounts of gravel, sandstone, brick fragments and ash over very soft to firm (becoming stiff in BH2 and PH45) sandy clay with varying amounts of ash, gravel or cobbles.

The made ground in the borehole locations was underlain by firm to very stiff clay and weathered rock (grey shale).

Groundwater entries were encountered within the made ground in both boreholes and probehole PH24 between depths of 1.00m and 3.00m.

An organic odour was noted in borehole BH2 between depths of 0.50m and 1.50m.

6. Offices (Former Underground Tank Location)

Made ground was encountered to a depth of 1.00m, comprising topsoil over loose sand over soft clay. The natural underlying material comprised soft to stiff clay with weathered sandstone at 2.30m.

Rapid groundwater entry was recorded within the natural soils at 3.00m, with the level rising rapidly to 2.30m.

A hydrocarbon odour was recorded between 2.30m and 3.20m.

7. Main Building

The main building is located on several different levels on land that slopes north to south. The eastern half of the building is on the lowest level (PH14 to 16, PH38, PH39 and PH43), the southern room ('resin room') in the western half of the building is on the middle level (PH1 to 5) and the remainder of the western half of the building is on the

upper level (PH6, PH21 and PH22). Probeholes PH17 and PH18 were drilled outside at the upper level adjacent to the bitumen tank and on the retaining wall for the reservoir adjacent to a disused fuel tank.

Groundwater was not encountered at any of the investigation locations in this area.

Hydrocarbon odour was only noted within the made ground in probehole PH15 between ground level and 0.30m depth (the base of the probehole).

The ground conditions encountered were as follows:

Lower Level

The depth of made ground on this level varied between 0.20m and 0.55m. Beneath a concrete or rough gravel surface the made ground comprised ash, sand and gravel in various proportions. Weathered sandstone was encountered at all but two of the probeholes (PH-14 and PH39), which encountered concrete obstructions at 0.50m and 0.27m respectively.

Middle Level

On this level made ground was encountered to depths of between 0.25m and 0.85m. Beneath a layer of concrete (0.20m thickness, reinforced in places) the made ground was variable, consisting of ash, clinker, brick and sandstone gravel, reworked clay and clayey silt. Weathered sandstone was encountered beneath the made ground at all locations.

Upper Level

Inside the main building made ground was encountered to depths of between 1.00m and 2.00m. Beneath the layer of concrete the made ground generally consisted of loose to moderately compact gravel and / or sand, containing ash in places and firm to stiff sandy clay. Weathered sandstone or stiff clay over weathered sandstone was encountered at all locations.

On the retaining wall for the reservoir, just to the north of the main building, made ground was encountered to the full depth of the probehole (4.00m) and comprised topsoil over gravel, cobbles and ash, over firm to stiff silty or sandy clay with a little gravel.

Next to the bitumen tank made ground was encountered to 1.50m, which comprised loose to moderately compact sand / sandy gravel matrix with some clay and gravel.

Solid bitumen was encountered in layers within the sand between depths of 0.30m and 0.50m. The made ground was underlain by weathered sandstone.

8. Central Building

Made ground was encountered to depths of 0.60m and 1.00m and comprised of concrete over sand and gravel fill containing ash, brick gravel and cobbles in places.

Groundwater was not encountered and there were no indications of hydrocarbon or solvent contamination.

9. The Croft and Bottom of Site

This area contains the deepest made ground on the site. At the southwestern corner of the site loose to moderately compact ash and clinker intermixed with firm sandy clay was proved to a depth of 11.00m (BH9).

A similar material was encountered beneath the surface sand and gravel in trial pits TP-8 and TP7 to depths of 2.10m and over 3.80m, respectively. In trial pit TP-8 the ashy material was underlain by a firm sandy clay (possibly reworked).

The probeholes drilled at the bottom of site also encountered made ground to depths of between 2.90m and 6.00m. The made ground consisted of various layers of gravel, sand, ash, brick fragments and generally firm to stiff sandy clay.

Natural strata were proved beneath the made ground in two of the probeholes (PH7 and PH10) and comprised weathered sandstone.

Slight groundwater entries were noted in probehole PH44 within the made ground below a depth of 3.00m.

10. Underground Tank Area

Made ground was encountered in this area to depths of between 0.18m (PH12) and 3.70m (PH42). The made ground consisted of a mixture of sand, sandstone gravel, brick gravel, ash and soft to firm sandy clay with various inclusions. Natural strata (weathered sandstone or stiff clay) were proved beneath the fill materials in two probeholes (PH8 and PH12) and both boreholes.

Slight groundwater entries were encountered between depths of 2.00m and 2.50m in borehole BH11 and probehole PH12 within the made ground and possible made ground.

Hydrocarbon odour was noted between ground level and 0.70m in boreholes BH10 and BH11 with a strong odour noticed at 1.70m in probehole PH42.

9.2 SUMMARY OF AREAS WITH EVIDENCE OF HYDROCARBON IMPACT

During the investigation visual or olfactory evidence of hydrocarbon/solvent impact was encountered in the following locations:

- Solvent Recovery (BH6, PH³⁴₂₄, PH37)
- Underground Tanks (BH10, BH11, PH42)
- Offices (BH4)
- South of Reservoir (TP6)
- Car Park (Former Reservoir) (BH2)

10. ASSESSMENT OF MINING

Historical and geological records indicate that the site is located in an area with a history of coal mining. This has included underground mining on and to the east of the property.

It is therefore recommended that a careful inspection of all excavation works during site development be completed in order to examine all formations for any disturbed ground, which may be indicative of backfilled workings.

A Coal Authority report dated October 17, 2002, indicated the following information in connection with the subject property:

- One seam of coal has been mined at shallow depth within 20m of the site, with the last extraction recorded as being in 1877.
- Records show that surface strata in the area could be coal bearing and the possibility of unrecorded mining activities cannot be discounted.
- There are believed to be two adits present in the southeastern corner of the site and one coal shaft (marked on maps as an Air Shaft) in the northeast of the site. There are no records of the measures that were taken to fill in the shaft or adits.

The Coal Authority were further contacted to obtain abandoned mine plans for the property. One abandoned mine plan was obtained for Lumn Mills Colliery, Sand Rock Mine (Abandonment Plan No. 818). The plan details two adits located on the properties eastern boundary connecting to coal workings to the east of the property. The Coal Seam is recorded as 1ft 9in thick. Notes on the map state that ' This is a shallow working in the Rough Rock'. There are no specific details of the actual depth of the workings. No further information was obtained on the air shaft. Based on the site inspection there was no visible indication of the adits. Investigation of these areas was precluded by the building development at these locations.

11. FRAMEWORK FOR SITE DEVELOPMENT

11.1 FOUNDATIONS ON NATURAL SOILS

Based upon inspection of the trial pits, probeholes and boreholes drilled by ENSR, over most of the site where made ground is less than 2m in thickness the proposed low rise housing may be supported on conventional strip foundations placed through any made ground and soft clays on the underlying natural firm and stiff clays or weathered bedrock. Such foundations may be designed to an allowable net bearing pressure of 100kN/m². The results of the plasticity index tests indicate the clays are of low shrinkage potential and a minimum foundation depth of 0.75m below the lower of existing or final ground levels should therefore be adopted on cohesive soils. A minimum foundation depth of 0.60m should apply where weathered sandstone bedrock is present at shallow depth.

Where the thickness of existing made ground and required oversite are in excess of 0.60m suspended cast in situ or pre-cast ground floor slabs will be required.

Within those parts of the site where trees are present or are to be planted then foundations depths should be in accordance with NHBC Chapter 4.2, Building Near Trees ⁽⁴⁾. Increased foundation depths will however not be required for any units underlain entirely by sand or bedrock.

Cohesive soils may become softened when wet and it will therefore be important to ensure that foundation excavations are not left open or exposed for long periods. It is recommended that all excavations be carefully inspected to ensure any soft spots are removed.

Great care will be required when demolishing the existing buildings to ensure existing substructures, drainage etc. are removed. Records of the locations of these services should be maintained so that they can be related to the proposed layout and appropriate action taken. This may comprise either extending the footings of new structures below the former substructures or designing the foundations to span over the disturbed ground.

11.2 FOUNDATIONS ON MADE GROUND

Within the site boundaries the historical plans and the findings from the current investigation indicate the presence of a number of former reservoirs and a quarry which have been infilled. The location of these identified features are indicated in Figure 2, together with the thickness of made ground identified during the ENSR investigation.

This includes six areas of infill but in addition other areas are present where significant thicknesses (greater than 2m) of made ground were recorded. These include an area to the north of the reservoir (TP9) and a larger area along the southern site boundary. It should be noted that other areas with significant thicknesses of made ground are likely to be present in other parts of the site and that the actual areas indicated in Figure 2 may vary from those shown. In these areas other foundation types will be required and at this stage an allowance for piled foundations should be made. It may be possible that ground treatment, such as vibro-compaction, may also prove suitable for some parts of the site.

A range of pile types may be suitable for conditions on site and specialist contractors should be consulted in respect to their system for the expected conditions on site. It is likely the fill materials will produce negative skin friction and this should be accounted for in the pile design. Advice in relation to pile type foundations should be obtained from NHBC Chapter 4.5.

11.3 OTHER COMMENTS ON FOUNDATIONS AND INFRASTRUCTURE DESIGN

Extensive areas of hard standing are present on parts of the site. These, together with any buried structures, will have to be removed prior to site redevelopment and foundations placed on the underlying firm to stiff cohesive soils and weathered mudstone. Removal of the concrete and excavations through bedrock will require hydraulic breakers. The broken concrete and brick could be crushed and re-used on site, subject to visual and olfactory assessment for hydrocarbons and solvents.

Excavations within the natural clays should remain open, however, side support will be required for all excavations deeper than 1.2m where personnel have to enter. All excavations in made ground are likely to require support.

Based upon inspection of the ground conditions road pavements should be designed on a California Bearing Ratio (CBR) value of 2 per cent in the clay and 2 to 5 per cent in the made ground. If any soft ground is encountered at formation level this should be removed and the road construction deepened accordingly. It would also be prudent to compact all formations before pavement construction in order to make good any loosening of the ground associated with excavation works.

In regard to services through made ground, advice should be sought from local utility companies in respect of any specific requirements that they may have for the ground conditions and chemical contaminants present on site.

Ground bearing slabs may generally be adopted after the removal of topsoil and provided the thickness of made ground does not exceed 0.6m. However, in the area of

thicker made ground (greater than 0.6m in thickness) and where the proximity of trees results in the need for foundation depths in excess of 1.5m, suspended slabs will be necessary. In the latter case underslab voids should be provided as specified in the NHBC Standards Chapter 5.2, Suspended Ground Floors: 1994.

12. DEVELOPMENT CONSTRAINTS

The following section summarises the main issues to be addressed in the site development which will have direct influence on the form and extent of any re-development work undertaken.

12.1 EXISTING RESERVOIR

The existing reservoir to the centre east of the site covers an approximate area of 1.25 hectares. In respect of future site development it would be possible to drain the reservoir and backfill it to a standard capable of supporting residential housing. Details of the construction to the dam structure are not available in detail. A cross section drawing dated April 17th 1924 shows two retaining walls at the end of an earth embankment structure adjacent to the buildings at the base of the dam. The construction materials of the retaining walls are not stated. It is likely that much of the embankment construction materials are site won clays taken from the plan area of the reservoir to form an earth embankment structure. These materials can be re-used to backfill the reservoir but such operations are likely to require additives, to improve or stabilise these clays. The addition of lime or cement have been used for similar site restoration schemes which should also be able to incorporate any silt deposits which reside in the base of the reservoir.

If it was considered appropriate to retain the reservoir then issues relating to ownership, liability and maintenance would have to be addressed with any prospective developer. Information in this respect is provided in the Reservoirs Act of 1975, which, although only applying to all reservoirs with a volume of 25000m³ of water, outlines the framework to ensure and maintain reservoir safety. Implementation of the Act (and maintenance of all records) is through the local authority who also are responsible for enforcement works.

12.2 CULVERTED WATER COURSE

The overflow from the reservoir is channelled around the west and southern reservoir boundaries before entering a culvert running southwards beneath the main works. It would be beneficial, at the time of site clearance works, for this culverted section to be removed and the culvert grubbed out. If, as suggested above the reservoir is cleared and restored, it would seem beneficial to re-route the stream running into the site in the north and to create an engineered channel for it along the eastern boundary of the site before discharging to the south. It is Environment Agency policy to promote open river or stream paths rather than culverted water flows. In addition they require a no-build zone or easement 8m in width on either side of a watercourse and installation of the

feature along or close to the site boundary would likely minimise the restriction this may pose to the redevelopment.

12.3 BACKFILLED RESERVOIRS AND QUARRIES

Several infilled reservoirs and a quarry area have been identified on site. Generally, although these contain significant thicknesses of infill, these areas can be re-developed with the use of appropriate foundation types. However, within limited areas gas monitoring has identified elevated concentrations of hazardous ground gases (methane and carbon dioxide) associated with variable gas flow rates which are occasionally elevated. Development over these areas may be possible but this would require longer term gas monitoring for confirmation of the ground gas regime. The scope of such monitoring would have to be agreed with the local authority Environmental Health Department.

As the areas with measurable gas concentrations cover a relatively small proportion of the site and also have the most difficult ground conditions for foundation installation it is recommended that they be used as areas of public open space or amenity. Such areas will be required on any housing development by the local authority Planning Department. Remediation of the underground tank areas to remove hydrocarbon contamination may result in a reduction of gas concentrations in these areas.

12.4 OLD ADITS AND AIR SHAFT

The investigation has identified two adits on or close to the site boundaries and an old air shaft to the north of the site. There is no available information as to whether or not these features have been infilled, capped, stowed or otherwise treated. These features were not identified during the presently reported intrusive investigation.

Once the site has been demolished and cleared further investigations for the features should be undertaken. At this stage it would be prudent for any developer to incorporate these areas into non development (non-housing) areas and public open spaces.

13. CONTAMINATION ASSESSMENT

13.1 SUMMARY OF CONTAMINATION ASSESSMENT

In order to assess whether the soils beneath a site are contaminated, the results of the chemical analyses have to be compared with suitable guidelines. Historically guidance has been sought from the Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL) using their Guidance Note 59/83⁽⁴⁾. However, in April 2002 the Contaminated Land Exposure Assessment Model (CLEA) was published. This was developed by the DoE, DETR, DEFRA and EA with the support of external consultancies. In support of the CLEA model, DEFRA have undertaken research into the toxicological properties of compounds. In the initial tranche, toxicological reports have been prepared for nine compounds, but it is understood that up to 40 more are to follow. Based on this new toxicological information, Soil Guideline Values to be used in risk assessments have been developed for the following end uses, using generic exposure assumptions.

- Residential Gardens with plant uptake
- Residential Gardens with no plant uptake (open space, communal gardens etc)
- Allotments
- Commercial (industrial) premises.

In the situation of a completed (or former) building surrounded by hardstanding and landscaped areas the most significant risks occur if excavations are opened up into the underlying fill. For domestic developments there are the added risks associated with the ingestion of contaminants via fruit and vegetables grown on the land.

It is understood that this site will be developed for residential purposes, and it has been assumed that in the worst case, fruit and vegetables will be grown. Consequently values appropriate to residential gardens with plant uptake (CLEA guidance) and residential gardens with no plant uptake (ICRCL threshold trigger values for domestic gardens (ICRCL guidance) have been used to assess the degree of contamination. These respective guidance values are included in Table 2

Neither CLEA or ICRCL 59/83 yet include guideline values for hydrocarbon contamination within soils and consequently the widely recognised Dutch Guidelines⁰ are often quoted. The Dutch Guideline values for Mineral Oil are accepted as the closest equivalent to TPH. The Dutch Guidelines provide no differentiation for site end use categories although two sets of values (Target and Intervention) are quoted for most

parameters and these are taken to indicate 'background' and 'significant contamination' concentrations respectively. These guideline values are shown in Table .

For some contaminants the CLEA/ ICRCCL threshold values were exceeded. Additional analyses were therefore carried out on leachates obtained from these samples. The ICRCCL or CLEA do not give threshold values for leachates and reference is therefore made to the Environment Agency publication on disposal of contaminated soils⁽¹⁰⁾.

There are currently no statutory contamination limits that apply in the UK for non-potable groundwaters and consequently the 'Dutch Guidelines'⁽⁷⁾ are often quoted. As for soils, two sets of values are quoted for most parameters which are generally interpreted as typical for uncontaminated waters (Target value) and indicative of significant contamination (Intervention value)

Where no Dutch IV guideline has been quoted, the Water Supply (Water Quality) Regulations 2000 have been referred to. These Regulations are generally used as the standards for drinking water quality, and are therefore more stringent. The respective Dutch and Water supply guideline values are included in Table .

This investigation included analysis of some forty soil samples for a broad range of chemical analysis. In addition leachability tests were carried out on eight selected soil samples to determine the potential mobility of contaminants. Groundwater analyses from standpipe installations in seven monitoring wells were carried out. A summary of the investigation locations and designated APCs is detailed below.

TABLE 13.1: Areas of Potential Concern and Investigation Locations

APC Reference	Description	Investigation Locations
1	Underground storage tanks (USTs) containing white spirit and mono ethylene glycol. Unused USTs formerly contained methanol	BH10, BH11, PH42
2	Antifreeze mixing area including three ASTs	PH12
3	Tetrosyl maintenance workshop and former dye works mechanics shop	No drilling access due to 12 inch thick concrete floor
4	Raw material drum compound and area of infill	PH40, PH41
5	Tetrosyl vehicle maintenance shed. The building was constructed on an area of ash fill	PH7, PH8
6	Fuel oil (diesel) AST supplying fuel for the vehicle maintenance shed. In the vicinity of an area of ash fill.	PH9, PH44
7	Diesel AST used for vehicle filling	PH10
8	Kerosene AST	BH8
9	Fuel (heating oil ASTs)	PH15
10	ASTs containing methylene chloride, sodium silicate, kerosene, and white spirit	PH3, PH4
11	Electrical transformer	PH5

TABLE 13.1 (Continued)

APC Reference	Description	
12	Sprinkler pump and diesel AST	PH5
13	Heating oil ASTs	PH13
14	Former Tetrosyl cap spraying room	PH39
15	AST not in use (former contents not known)	PH17
16	Bitumen AST	PH18
17	Tetrosyl resin room and location of former reservoir for the printworks.	PH1, PH2, PH6
18	Infilled former reservoir	BH2, BH3, PH24, PH45
19	Former USTs infilled with concrete (located under current office area)	BH4
20	Solvent drum filling area	PH37
21	Solvent recovery plant	BH6, PH33, PH34, PH35
22	Drum crushing plant	PH30
23	Solvent tank Farm	PH31, PH32
24	Waste sludge reclamation plant	PH36
25	Former quarry and landfill	PH28, PH29, BH7, TP10, TP11
26	Heating oil AST	PH20
27	Open area surfaced with road planings	PH27, TP3, TP4, TP5
28	Diesel AST	PH19
29	Area adjacent to off-site infilled sewage tanks, Mill Road car park	BH9, TP7, TP8
30	Former reservoir (north of maintenance shed)	PH8, PH40
31	Infilled ground to south of reservoir	BH5, TP6
32	Infilled ground to east of reservoir	No access

13.2 SOILS ANALYSIS

13.2.1 Contamination Assessment - Areas of Potential Concern

The section provides a contamination assessment of each identified APC and the other general areas of the site that were investigated by ENSR.

APC1: Underground Storage Tanks (BH10, BH11, PH42)

One soil sample from (PH42 @1.7m) and groundwater samples from PH42 and BH10 were analysed for TPH, BTEX, and VOCs.

In the soil sample from PH42, the concentration of TPH (1600ppm) exceeded the Dutch target value (TV) (50mg/kg) but was below the Dutch intervention value (IV) (5,000mg/kg). The concentrations of aromatic hydrocarbons: toluene (620ppm), ethylbenzene (95ppm), and xylene (280ppm) all exceeded the respective Dutch IV's of 130, 50, and 25ppm respectively. The concentration of total VOCs was <1ppm. Due to the high reporting limit resulting from the high concentrations of BTEX it is not possible to compare this result with the VOC assessment criteria.

In the groundwater sample from PH 42 the concentrations of TPH (30,000 ppb); benzene (45 ppb), toluene (21,000 ppb), ethylbenzene (1500 ppb), and xylene (4,400 ppb) all exceed the respective Dutch IVs for groundwater.

In the groundwater sample from BH10 (located on the assumed down gradient side) the concentrations of TPH (<50ppb), benzene (<2ppb), toluene (<2ppb), ethylbenzene (6ppb), xylene (18ppb) are all below the respective Dutch IVs for groundwater.

APC2: Tetrosyl Antifreeze Mixing Area (PH12).

One soil sample (PH12 @1.5m) was analysed for the general suite. The concentration of phenols (5.27ppm) marginally exceeded the ICRL threshold trigger (5ppm). For all other tested determinants the measured concentrations were below the quoted assessment criteria. Based on the leachability analysis the concentrations of all phenols were below the quoted assessment criteria.

APC3: Tetrosyl Maintenance Workshop and Former Dye Works Mechanics Shop

No drilling access was available to subsurface soils as a result of a 12-inch thick concrete floor.

APC4: Raw Material Drum Storage Compound and Area of Infill (PH40, PH41)

Two soil samples (PH40 @ 1.0m, PH41 at 0.8-0.9m) were analysed. PH40 was analysed for TPH, BTEX, and VOCs; PH41 was analysed for the general suite. For PH40 the concentrations of the tested determinants were below the limits of detection of 10ppm for TPH, and 0.1ppm for BTEX and VOCs. For PH-41 the concentrations of arsenic (22ppm) and lead (492ppm) exceeded the quoted assessment criteria (22ppm and 492ppm). For all other tested determinants the concentrations were below the quoted assessment criteria.

APC5: Tetrosyl Vehicle Maintenance Shed and Area of Infill (PH7, PH8)

One soil sample (PH7 @ 1.0-2.0m) was analysed for the general suite. For all tested determinants the measured concentrations were below the quoted assessment criteria.

APC6 Fuel Oil (Diesel AST) and Area of Infill (PH9, PH44)

Two samples from one location (PH9 @ 0.8-0.9m, and PH9 @ 1.4-1.5m) were analysed for the general suite. For the lower sample at 1.4-1.5m for all tested determinants the measured concentrations were below the quoted assessment criteria. For the upper sample at 0.8-0.9m the concentrations of arsenic (25ppm) and sulphate (7,093ppm) exceeded the quoted assessment criteria (20ppm and 2000ppm respectively). In order to determine the potential mobility of the determinants the upper sample was analysed for leachable components. Based on the leachability analysis the concentrations of all tested determinants in the general suite, including arsenic and sulphate, were below the quoted assessment criteria.

APC7: Diesel AST for Vehicle Filling (PH10)

Two soil samples from one location (PH10 @ 0.6-0.7m and PH10 @ 1.1-1.8m) were submitted for analysis.

The soil sample at 0.6-0.7m was analysed for TPH and BTEX. The concentration of TPH (>4000ppm) had a carbon range of C10 to C36. The total concentration of TPH may exceed 4000ppm as a result of higher end carbon. A concentration of 4000ppm exceeds the Dutch TV (50ppm) but is below the Dutch IV (5000ppm).

The soil sample at 1.1-1.8m was analysed for the general suite. The concentration of arsenic (43ppm) exceeded the quoted threshold of 20ppm. For all other determinants the measured concentrations were below the quoted assessment criteria. In order to determine the potential mobility of the determinant exceeding the assessment criteria the sample was analysed for leachable components. Based on the leachability analysis

the concentrations of all tested determinants in the general suite, including arsenic, was below the quoted assessment criteria.

APC 8 Kerosene AST (BH8, PH16)

One borehole (BH-8) was drilled adjacent to the Kerosene AST. The borehole was terminated at 1.6m by a concrete obstruction (possibly associated with the culverted stream). The soil encountered above this depth comprised sandstone infill. No samples were submitted for laboratory analysis from this location. A probehole (PH16) was drilled in the vicinity of this location and one sample (PH16 @ 0.4m) submitted for TPH and BTEX analysis. The concentration of benzene (0.1ppm) exceeded the Dutch TV (0.01ppm) but was below the Dutch IV (1ppm). For all other determinants the concentrations were below the Dutch TVs.

APC9: Heating Oil ASTs (PH15)

One soil sample (PH15 @ 0.2m) was submitted for analysis for TPH and BTEX. The concentration of TPH (1200ppm) exceeded the Dutch TV (50ppm) but was below the Dutch IV (5000ppm). The concentrations of toluene (0.4ppm), ethylbenzene (0.2ppm), and xylene (0.8ppm) all exceed the respective Dutch TVs but are below the Dutch IVs of 130ppm, 50ppm, and 25ppm.

APC10: ASTs containing methylene chloride, sodium silicate, kerosene, and white spirit (PH3, PH4)

Two probeholes were drilled adjacent to the bunded tank area. Based on field observations there were no indications of soil impact. No samples were therefore submitted for analysis from this location.

APC11: Electrical Transformer (PH5)

One soil sample (PH5 @ 0.15-0.5m) was submitted for analysis for PCBs. The concentration of PCBs (< 0.05ppm arachlor) was below the laboratory detection limit.

APC12: Sprinkler pump and diesel AST (PH5)

One probehole (PH5) was drilled in the vicinity of the sprinkler pump and diesel AST. Based on field observations there was no indication of diesel spillage. No samples were therefore submitted for TPH analysis from this location.

APC13: Heating Oil ASTs and Former Underground Tank (PH13, PH42)

This location is in the vicinity of APC 1. The results reported for PH 42 in the APC1 section are applicable to APC13.

APC 14: Former Tetrosyl Cap Spraying Room (PH 39)

One probehole (PH39) was drilled in the vicinity of APC14. Based on field observations and measurements there was no indication of soil impact. No samples were therefore submitted for laboratory analysis from this location.

APC15: AST (not in use) (PH 17)

Two soil samples from one location (PH17 @ 2.4-2.6m) were submitted for analysis for TPH and BTEX. The concentration of TPH (170ppm) exceeded the Dutch TV (50ppm) but was below the Dutch IV (5000ppm). The respective concentrations of toluene, ethylbenzene, and xylene, (0.8ppm, 1.4ppm, 2ppm) exceeded the Dutch TVs but were below the Dutch IVs of 130, 50 and 25ppm respectively.

APC16: Bitumen AST (PH18)

One sample (PH18 @ 1.6-1.8m) was submitted for analysis for TPH and PAH. The concentrations for both TPH and PAH were below the laboratory detection limits of <10 and 0.1ppm respectively.

APC17: Tetrosyl Resin Room and Location of Former Printworks Reservoir (PH1, PH6)

Two samples (PH 1 @ 0.15-0.25m and PH6 @ 1.6-1.7m) were submitted for analysis for the general suite. The concentration of arsenic (32ppm) and chromium (977ppm) in PH1 exceeded the respective quoted standards of (20ppm and 600ppm). The concentration of hexavalent chromium (<0.1ppm) was below the quoted standard of 130ppm. The concentration of boron in PH6 (181ppm) exceeded the quoted threshold of 3ppm.

In order to determine the potential mobility of the determinants exceeding the assessment criteria both samples from PH1 and PH6 were analysed for leachable components. Based on the leachability analysis the concentrations of arsenic (<0.002ppb) and chromium (23ppb) in the sample from PH1 were below the quoted leachate thresholds of 0.01ppm and 50ppm respectively. In the sample from PH6 the concentration of Boron in leachate (8.47ppb) exceeded the leachate threshold of 2ppm.

APC 18: Infilled Former Reservoir (BH2, BH3, PH24, PH45)

One soil sample (PH-24@1.0m) and one groundwater sample (BH2) were submitted for analysis.

The soil sample was submitted for analysis for the general suite. For all tested determinants the measured concentrations were below the quoted assessment criteria.

The groundwater sample was submitted for analysis for the general suite, TPH, BTEX, and VOCs. For all tested determinants the measured concentrations were below the quoted assessment criteria.

APC 19: Former Underground Storage Tanks (located under the current office building)

One soil sample (BH4 @ 3.0–3.1m) and one groundwater sample (BH4) were submitted for analysis for TPH, BTEX, and VOCs.

The concentration of TPH in the soil sample (200ppm) exceeded the Dutch TV (50ppm) but was below the Dutch IV (5000ppm). The concentrations of toluene and ethylbenzene (0.5ppm, and 26ppm) exceeded the respective Dutch TVs (0.01 and 0.03ppm) but were below the Dutch IVs (130ppm and 50ppm). The concentration of xylene (92ppm) exceeded the Dutch IV (25ppm).

The concentration of TPH in the groundwater sample (1600ppb) exceeded the Dutch IV (600ppb). The respective concentrations of ethylbenzene and xylene (550ppb and 1600ppb) exceeded the Dutch IVs (150ppb and 70ppb).

APC 20: Solvent Drum Filling Area (PH37)

One soil sample (PH37 @ 1.7-1.9m) was submitted for analysis for TPH, BTEX, and VOCs. The concentrations of benzene, toluene, ethylbenzene, and xylene (0.1ppm, 7.9ppm, 2.5ppm, and 14ppm), exceeded the Dutch TVs but were below Dutch IVs. The concentration of TPH was below the Dutch TV. The concentration of VOCs was below the laboratory detection limit.

APC 21: Solvent Recovery Plant (BH6, PH33, PH34, PH35)

Two soil samples (PH35 @ 1.8-1.9m, BH6 @ 1.5-1.95m) and one groundwater sample (BH6) were submitted for analysis. The soil sample from PH35 and groundwater sample from BH6 was submitted for TPH, BTEX, and VOC analysis. The soil sample from BH6 was submitted for VOC analysis.

The concentration of ethylbenzene (0.4ppm) in PH35 exceeded the Dutch TV (0.03ppm) but was below the Dutch IV. The concentrations of TPH, BTEX and VOCs were all below the laboratory detection limits. The concentration of VOCs in BH6 was below the laboratory detection limit.

In the groundwater sample from BH6, the concentration of TPH (8,500ppb), toluene (8,300ppb), ethylbenzene (780ppb) and xylene (1900ppb) exceeded the respective Dutch IVs of (600ppb, 1000ppb, 150ppb, and 70ppb). The concentration of VOCs was below the laboratory detection limit.

APC 22: Drum Crushing Plant: (PH30)

One sample (PH30 @ 0.3-0.5m) was submitted for analysis for TPH, BTEX, and VOCs. The concentrations of toluene (1ppm), ethylbenzene (0.1ppm), and xylene (2.4ppm) exceeded the respective Dutch TVs but were below the Dutch IVs (130ppm, 50ppm, and 25ppm). The concentration of TPH (13ppm) was below the Dutch TV. The concentration of VOCs was below the laboratory detection limit.

APC 23: Solvent Tank Farm (PH31, PH32)

One sample (PH32 @ 1.6-1.8m) was submitted for analysis for TPH, BTEX, and VOCs. The concentrations of all tested determinants were below the laboratory detection limits.

APC 24: Waste Sludge Reclamation Plant (PH36)

One sample (PH36 @ 3.7-3.8m) was submitted for analysis for the general suite, TPH, BTEX, and VOCs. The concentration of Boron (14ppm) exceeded the quoted assessment criteria (3ppm). The concentration of ethylbenzene (0.6ppm) exceeded the Dutch TV (0.03ppm) but was below the Dutch IV (50ppm). The concentrations of TPH, toluene, xylene, and VOCs were all below the laboratory detection limits.

APC 25: Former Quarry and Landfill (PH28, PH29, BH7, TP10, TP11)

One sample (PH28 @ 1.3-1.5m) was submitted for analysis for the general suite. The concentration of sulphate (2,966ppm) exceeded the quoted assessment criteria (2000ppm), for all tested determinants the measured concentrations were below the quoted assessment criteria. The sample was submitted for leachability testing to determine the potential mobility of contaminants. All tested determinants including sulphate were below the quoted assessment criteria.

APC26: Heating Oil AST (PH20)

One probehole (PH20) was drilled in the vicinity of APC26. Based on field observations and measurements there was no indication of soil impact. No samples were therefore submitted for laboratory analysis from this location.

APC27: Open Vehicle Parking Area (PH27, TP3, TP4, TP5, BH1)

Two samples (TP1@0.6m, TP3@0.6) were submitted for analysis for the general suite. For all tested determinants the measured concentrations were below the quoted assessment criteria.

APC28: Diesel AST (PH19)

One probehole (PH20) was drilled in the vicinity of APC26. Based on field observations and measurements there was no indication of soil impact. No samples were therefore submitted for laboratory analysis from this location.

APC 29: Area Adjacent to Offsite Infilled Sewage Tanks (BH9, TP7, TP8)

One soil sample (TP7 @ 0.6m) and one groundwater sample (BH9) were submitted for analysis for the general suite. The concentrations of all tested determinants for the soil and groundwater samples were below the quoted assessment criteria.

APC 30: Former reservoir (PH8, PH40)

The soil sample from APC 4 (PH40) corresponded with this area.

APC31: Infilled Ground to South of the Reservoir (BH5, TP6)

One soil sample (TP6 @ 0.6m) and one groundwater sample (BH5) were submitted for analysis. The soil sample was submitted for the general analysis suite, the groundwater sample was submitted for the general analysis suite, TPH, BTEX, and VOCs.

The concentration of sulphate (2,380ppm) in the soil sample exceeded the quoted assessment criteria (2,000ppm). For all other tested determinants the concentrations were below the quoted assessment criteria.

The concentration of all tested determinants in the groundwater sample were below the quoted assessment criteria.

APC 32: Infilled Ground to East of Reservoir (TP7)

There was no access available to this part of the site. No sampling and analysis was therefore undertaken at this APC.

13.2.2 Contamination Assessment - General Site Areas

In addition to investigation of the identified areas of potential concern (APCs), additional areas of the site were investigated to determine general soil and groundwater quality across the site.

At PH 11 in the Tetrosyl storage building one sample @ 0.8-0.9m was analysed for the general suite. The concentrations of arsenic (70ppm), copper (207ppm), nickel (75ppm), and zinc (341ppm) exceeded the quoted assessment criteria. This sample was submitted for leachability analysis and all tested determinants were below the quoted assessment criteria.

At PH 14 one sample @ 0.3m was analysed for the general suite. The concentrations of boron (15ppm), sulphate (3,706ppm) and cyanide (436.9ppm) exceeded the quoted assessment criteria. This sample was submitted for leachability analysis; the concentrations of sulphate (157ppb) and cyanide (0.99ppb) exceeded the quoted assessment criteria of 150ppb and 0.05ppb respectively.

At PH 21 one sample @ 0.5-0.6m was analysed for the general suite and one at 1.0-1.1m for VOCs. The concentrations of arsenic, lead, copper, nickel, zinc, and sulphate all exceeded the quoted assessment criteria. The sample was submitted for leachability analysis to determine the potential mobility of the contaminants. The results of the leachability analysis showed no exceedences for any of the tested determinants. The concentration of VOCs in the deeper sample was below the laboratory detection limit.

Three samples from PH22 @1.7m, PH23 @1.2m, PH25 @1.5-1.6m, and PH38 @0.4m were tested for the general analysis suite. The concentrations of all determinants tested were below the quoted assessment criteria.

13.2.3 Asbestos Analyses

Asbestos analysis was carried on five samples collected at five locations across the site. Three samples were selected based on visual evidence of fibrous material in made ground and two samples from other representative samples of made ground areas of the property. The three samples with visual evidence of fibrous material (PH16, PH14, and PH29) all had detectable asbestos. At PH16 samples of fibrous board were determined to contain amosite. At PH14 samples of woven fabric were determined to contain chrysotile. At PH29 fibrous fragments were determined to contain amosite and

chrysotile. No other areas of asbestos were identified based on visual observation of samples.

13.3 GROUND GAS In the United Kingdom there are no statutory threshold limits for hazardous gases in the ground. However, guidance is provided in Waste Management Paper 27⁽⁷⁾ and approved Document C to the Building Regulations ⁽⁸⁾, which set threshold concentrations for methane and carbon dioxide of 1% by volume and 1.5% by volume respectively. These documents however make no allowance for gas flow rates.

Methane

Methane was detected at concentrations above the guidance limit (1% by volume) at the following locations: BH10, BH5, PH24, BH2, and PH42.

BH10, which is located adjacent to the underground tank storage area on the southern property boundary, has shown consistently high concentrations on the four monitoring visits. The percentage volume of methane (steady reading) has ranged from 23.4% to 39%. An additional sample of gas was submitted for laboratory analysis in order to confirm the presence of methane. This confirmed a percentage volume concentration of methane of 37.1%. The measured flow rates have been generally low, ranging from <0.1 litres/hour to 1.5 litres/hour, thereby indicating generally low gas production rates.

In PH42, which is located to the north of the underground tank storage area and BH10, has shown two readings exceeding the guidance limit. The percentage volume of methane has ranged from 1.2% to 7.4%.

BH2 and PH24, which are located in the infilled reservoir on the western boundary of the site have shown elevated readings. In BH2, there has been one slightly elevated reading of 1.6% over the three monitoring visits; the corresponding flow rate on this occasion was <0.1 litres/hour, indicating no measurable flow. In PH24 there has been two elevated readings over the three monitoring visits. The methane concentrations have ranged from <0.1% to 2.2%. The maximum flow rate measured in PH24 was 0.1 litres/hour, indicating low gas production rates.

BH5, which is located in the infilled ground to the south of the reservoir, has shown one reading (1.1%) above the instrument detection level on one of three monitoring occasions. The gas flow rate on this occasion was low at 0.3% indicating low gas production rates.

Carbon Dioxide

Carbon Dioxide was detected at concentrations above the threshold concentration (1.5% by volume) at the following locations: BH1, BH10, BH4, PH9, PH10, PH24, PH42. Methane and carbon dioxide were therefore detected above the threshold concentrations at BH10, PH24, and PH42.

BH1, located on the northern boundary of the property, has shown one carbon dioxide reading (8.1%) above the threshold concentration over three monitoring visits.

BH4, located adjacent to the former underground storage tanks, has shown two carbon dioxide readings above the threshold concentrations. Concentrations have ranged from 1.5 to 3.3 %. Measured flow rates have been low, ranging 0.1-0.3 %, indicating low gas production rates.

PH9, located adjacent to the diesel AST and in an area of infilled ground has shown two readings above the threshold concentrations over four monitoring visits. Concentrations have ranged from <0.1 to 2.0 %. The gas flow rates have all been below the detection limit of the instrument (<0.1%) indicating low gas production rates.

PH10, located adjacent to the diesel aboveground storage tank and in an area of infilled ground, has shown three readings above the threshold concentrations over three monitoring visits. The steady concentrations have ranged from 2.2 to 3.8 %. The maximum flow rate recorded was 0.1 litres/hour, indicating low gas production rates in this area.

13.4 GROUNDWATER ANALYSIS

The results of the groundwater analyses are presented in Table 3. The results have been compared with the Water Supply (Water Quality) Regulations 2000, maximum admissible concentrations (MAC), or Dutch Guidelines where there is no UK guidance.

Groundwater was sampled from seven monitoring well locations across the property at BH2, BH4, BH5, BH6, BH9, BH10, and PH42.

In BH2 located in the infilled former reservoir area, the groundwater sample was tested for the general suite, TPH, BTEX, and VOCs. The standpipe was installed in the made ground in perched water. For all determinants tested there were no exceedences of the quoted assessment criteria.

In BH4, located adjacent to the former underground storage tanks under the office building, the groundwater sample was tested for TPH, BTEX, and VOCs. The standpipe was installed in the natural ground (clay and sandstone). The concentration of TPH (1600ppb) exceeded the Dutch IV (600ppb). The concentrations of ethylbenzene

(550ppb), and xylene (1600ppb) both exceeded the respective Dutch IVs. The concentration of VOCs and other aromatic hydrocarbons were below the quoted thresholds or laboratory detection limits.

In BH5, located in the infilled ground to the south of the reservoir, the groundwater sample was tested for the general suite, TPH, BTEX, and VOCs. The concentration of all determinants tested was below the quoted thresholds.

In BH6, located in the solvent recovery area, the groundwater sample was tested for TPH, BTEX, and VOCs. The concentrations of TPH (8,500ppb), toluene (8,300ppb) ethylbenzene (780ppb), and xylene (1,900ppb), all exceeded the respective Dutch IVs. The concentrations of VOCs and benzene were below the quoted thresholds or laboratory detection limits.

In BH10, located in the south of the property adjacent to the underground storage tanks, the groundwater sample was tested for TPH, BTEX and VOCs. The concentrations of all determinants tested were below the quoted thresholds or laboratory detection limits.

In PH42 located to the north of BH10 in the vicinity of the underground storage tanks the groundwater sample was tested for TPH, BTEX, and VOCs. The concentrations of TPH (30,000ppb) and all BTEX compounds exceeded the Dutch IVs. The laboratory detection limit for VOCs was high as a result of the dilution of the sample required for the TPH and BTEX analysis.

IN BH 9, located in the Croft area on the southern part of the site, the groundwater sample was tested for the general suite. With the exception of sulphate the concentrations of all tested determinants were below the quoted thresholds.

14. CONTAMINATION RISK ASSESSMENT

In the UK there are currently no statutory limits by which to measure soil contamination. The recent Statutory Guidance issued under Part IIA of the Environmental Protection Act 1990 outlines the assessment process to be used in the evaluation of contaminated land. It introduces the concept of risk assessment using the source - pathway - receptor (target) linkage.

In summary the guidance requires that firstly a pollutant linkage must exist and that linkage must be causing significant harm.

To that end contaminated land is defined as:

'land which appears to the local authority to be in such a condition by reasons of substances in, on, or under the land, that significant harm is being caused, or there is a significant possibility of such harm being caused, or that pollution of controlled waters is being, or is likely to be, caused.'

The assessment of significant harm will be dependent upon the concentrations of each contaminant. The presence of a contaminant does not mean that the site is itself 'contaminated' as defined above.

Further, under the Environmental Protection Act 1990 a site may be designated as a special site. Such a designation can be made only under the guidance of the Environment Agency. Such a designation is likely where the pollutant linkage can be demonstrated as being likely to cause serious harm or serious pollution to waterways or underground strata. Where a site has been designated as a special site additional provisions apply in relation to the site remediation.

The process of qualitative risk assessment is an accepted approach to be taken in providing remedial strategies to enable the site to be brought into beneficial use with the elimination of residual environmental liabilities. The principles that underlie this approach are detailed in the CIRIA Special Publication 103 and are summarised below.

14.1 CONTAMINATION HAZARD

The presence of a source of 'contamination' at a site does not alone constitute a need to remediate that site. Rather, an assessment of the risk(s) resulting from that source must be established. The process of Risk Assessment has been defined as:

"An evaluation of the potential for adverse effects to occur on specific receptors, based on factual knowledge about a site, scientific theories concerning the environmental behaviour and toxicity of the materials present, assumptions made in the absence of data and pre-determined acceptability criteria".

It is this philosophy which underlies the current UK approach to contaminated land assessment. Risk is simply the product of exposure and toxicity (effects). If that risk is shown to be unacceptable against agreed criteria then action should be taken.

The concept of comparing concentrations against guidance values remains a viable method of screening a site. In undertaking this process the worst case scenario can be tested for a given degree of acceptable risk. This takes into account environmental effects, site end use and potential receptors (targets), e.g. human beings, surface and groundwaters, building structures. No other site-specific information is included when screening.

A number of different models exist for site specific risk assessment and the principles upon which all of these are based are well established. Risk assessment requires that a plausible hazard-pathway-receptor linkage is identified and that contaminants are present at concentrations which will result in an unacceptable impact.

Where the pollutant linkage has been confirmed a formal risk assessment is undertaken to establish the likelihood of an unacceptable risk being present. This involves consideration of:

- The concentrations, distribution and mobility of the substances identified.
- The nature of the pathway and the duration of the exposure between the target and the source.
- The characteristics of the target (e.g. is the target a pica child or a construction worker; if the target is a water body, what is its classification or sensitivity?).
- The nature of the effect (e.g. is damage to health acute or chronic, what effect will be demonstrated upon the receiving environment?).

Once completed, site-specific acceptability levels may be established and consideration can be given to the remediation options that are available to remove or ameliorate any risk that may be present. Using this accepted approach, project costs can be controlled such that both the costs and the benefits of remediation can be balanced. In this way the costs of treating the site will not be disproportionate to the overall benefit that will result.

The results of this investigation based on the site observations and laboratory analysis has shown that impact of subsurface soils and groundwater has occurred as a result of historical operations at the site. A summary of this impact is detailed below.

Areas with hydrocarbon/ aromatic hydrocarbon impact

There are a number of localised areas of petroleum hydrocarbon and aromatic hydrocarbon (BTEX) impact, all of which are associated with spillages from the operations of the site (i.e. they are related to the APCs). Analysis has shown that the concentration of these organic contaminants (TPH, BTEX) in groundwater exceed the Dutch Intervention Values at three locations. These locations where groundwater has been impacted significantly are areas where current or former storage of organic compounds in underground tanks has taken place. In all other areas the concentrations of TPH and BTEX in groundwater are all below the quoted thresholds or method detection limits in the borehole samples. Areas of the property where soil has been impacted with TPH and or BTEX are as follows:

- Solvent recovery area (PH30, PH36, PH35, PH37)
- Offices - former underground storage tanks (BH4)
- Infilled area south of the reservoir and nearby above ground storage tank (TP6, BH17)
- Near to Kerosene above ground storage tank (PH16)
- Hydrocarbon above ground storage tanks (PH15)
- Diesel above ground storage tank (PH10)
- Underground storage tank area (PH42)

There is one location (PH12) where the concentration of phenol in soil exceeded the quoted threshold. The leachability test, however, from this sample indicated that the phenol is not mobile.

Areas with metals/ non-organic determinants

Elevated concentrations of some metals and sulphate occur in specific areas of the site. The leachability analyses undertaken demonstrate that these inorganic determinants are generally of low solubility and hence are relatively immobile and will not be available to affect receptors.

Specific areas where metals and/or sulphate impact were determined are as follows:

PH10 (arsenic at 1.1-1.8m) in ashy made ground
PH9 (sulphate at 0.8-0.9m) in ashy made ground
PH41 (arsenic and lead at 0.8-0.9m) in sandy clay made ground

PH11 (arsenic, copper, nickel and zinc at 0.8-0.9m) in ashy made ground
PH14 (boron, sulphate and cyanide at 0.3m) in ashy made ground
PH1 (arsenic and chromium at 0.25m) in ashy made ground
PH6 (boron at 1.7m) in sandy silty clay
PH21 (arsenic, lead, copper, nickel, zinc, and sulphate at 0.5-0.6m) in sandy made ground
TP6 (sulphate at 0.6m) in made ground
PH28 (sulphate at 1.3-1.5m) in ashy made ground
PH36 (Boron at 3.7-3.8m) in clayey silt

The areas impacted with metals are predominantly areas of ashy made ground with a number of areas of sandy or clayey made ground and one area of natural ground (PH36). In the areas of ashy made ground it is likely that the metals are present in the ash and are not derived from spillages from historical site operations.

There is one area with cyanide impact (PH14) at shallow depth (0.3m). This appears to be associated with ashy made ground above a concrete obstruction at 0.5m. Cyanide impact was not detected at any other location on the property.

14.2 SENSITIVE RECEPTORS

There are a number of sensitive receptors that may be affected by the contamination hazards at the present time, during site redevelopment and in the future. These are as follows:

1. Tributary of Pigs Lee Brook
2. Reservoir on tributary of Pigs Lee Brook
2. Site operatives during redevelopment
3. End users of the site
4. Proposed houses
5. Areas of landscaping
6. Proposed infrastructure
7. Existing adjacent sites

14.3 MIGRATION PATHWAYS

The routes by which contamination hazards could come into contact with the receptors are:

1. Direct contact with site operatives, the public, and the eventual end users of the site.
2. Surface water run-off

3. Surface water flow via tributary of Pigs Lee Brook
3. Existing or proposed service runs
4. Groundwater migration
5. Gas migration
6. Vapour migration from volatile compounds
7. Airborne dust during development works and subsequently during site occupation.

14.4 ASSESSMENT OF RISK

Considering the preceding sections of this report, potential risk to certain receptors can be discounted or adequately controlled by remedial action. These are discussed as follows:

1. Tributary of Pigs Lee Brook and Reservoir

The tributary of Pigs Lee Brook and man made reservoir are located in the western sector of the subject property. Water is currently abstracted by Tetrosyl from the reservoir for use in the solvent recovery plant for cooling purposes. During remediation works on the site in the vicinity of the Brook and reservoir protection measures will be required to ensure that excavated contaminants do not enter these water bodies.

2. Site operatives during redevelopment

Site operatives will be in direct contact with the made ground during earthworks operations and exposed to airborne dust. There is therefore a complete linkage for this receptor group. However, in view of the limited exposure duration, the risk will not be significant. Nevertheless, the limited risks to such operatives will be further reduced with the provision of sensible health and safety measures on site. This should include the provision of cleaning facilities and the adoption of a no smoking, eating and drinking policy on site other than in designated areas. Dust suppression measures should be available and implemented when necessary during the regrading works.

With these measures in place, this linkage will be adequately controlled.

3. End users of the site

The site is proposed for residential use and the main risk to end users of the site would be through direct contact with contaminated materials or from fruit and vegetables grown in the gardens. Within those parts of the site where natural uncontaminated soils are present no such risks exist.

Elsewhere end users would be exposed to both the hazard sources identified in Section 13.1 above. The most significant potential for harm would be associated with petroleum hydrocarbons and aromatic hydrocarbons (BTEX) via direct ingestion, dermal contact, possible dust generation and vapour emissions. This complete linkage would result in significant potential for significant harm. However, since these contaminants are present in localised areas associated with the APCs, and can therefore be removed. It is considered that in view of the sensitivity of the end use, complete removal of these contaminated soils is the best method to deal with this linkage.

There will also be a complete linkage with the inorganic contaminants that are bound predominantly into the ashy layers of the made ground. However, the leachability analyses, supported by the groundwater analyses, indicate the generally low solubility of these contaminants, which are considered unlikely to be available to any plants to be grown within such soils. It is also noted that in view of the comments above, the areas of made ground associated with the hydrocarbon impacted APC's will be removed. For horticultural purposes it will be necessary to provide gardens with a minimum 300mm layer of subsoil and topsoil over the existing soil (subject to final site levels) which would further reduce the limited risk.

4. Proposed Houses

From the monitoring visits undertaken there are recorded concentrations of both methane and carbon dioxide at concentrations above recognised guidance levels in a number of the monitoring boreholes. Gas generation rates appear to be low based on the measured flow rates. It is recommended that in these areas where gas has been detected the land is used for landscape or car parking use.

As a further precautionary measure it is recommended that longer term monitoring is undertaken prior to development and passive gas protection measures be incorporated into the houses to prevent the risk of potential gas migration and collection in confined spaces.

Within the made ground there are elevated concentrations of sulphate associated with near neutral and slightly alkaline pH conditions. The precautions for buried concrete will be required and are outlined in Section 15.

5. Areas of landscaping

It is assumed that parts of the site will be proposed for public open space and within these areas the main risk to end users of the site would be through direct contact with

contaminated materials and to the growth of plants and vegetation. Within those parts of the site where natural uncontaminated soils are present no such risks exist.

In the made ground there are elevated concentrations of inorganic contaminants (as outlined in point 3. above) including the presence of occasional elevated concentrations of phytotoxic determinants which are deleterious to plant growth. Given the nature of open space areas the risks associated are considered to be less significant than in privately owned gardens. Consequently the comments made for end users of the site in point 3 above apply.

6. Proposed infrastructure

The investigation has identified isolated areas of petroleum hydrocarbon, aromatic hydrocarbon and phenol impact on the property. There is therefore a potential of significant harm. This will largely be avoided by the removal of the hotspots of hydrocarbon contamination required to protect the end users. However, as an added precaution, it is recommended that all service runs in made ground be carefully inspected and any materials visually assessed as unsuitable should be removed and replaced by clean inert materials.

7. Existing adjacent sites

Background levels of contaminants have not been established within the adjacent areas. The local authority has no records of contamination or potential contamination associated with the adjacent land to the subject property other than the landfill associated with the former sewage tanks to the south of the site. The principal potential pathway associated with the hazards on the subject site will be a result of airborne dust migration during demolition, remediation and development works. Although the limited exposure duration should not generate a significant potential for harm there could be a significant risk if any asbestos identified in the buildings is released. It is therefore essential that a detailed method statement is prepared by the specialist demolition contractor and the remediation method statement includes allowance for limiting dust generation.

15. REMEDIATION STRATEGY

Given the contaminative risk that conditions pose to site operatives during redevelopment, end users, proposed houses, areas of landscaping and proposed infrastructure, it will be necessary to carry out a number of remedial measures to protect the development and in order to minimise the potential liabilities associated with the site. Furthermore to provide maximum confidence for funders and investors, it will be necessary to carry out supervision and validation of site remedial operations. It will be necessary to prepare a detailed remedial action plan which should be approved with the local authority (Environment Protection Section, Building Control and Highways Department) and NHBC in advance of site operations. The necessary remedial actions are summarised as follows:

- 1) The existing works will have to be cleared and demolished (excepting buildings that are planned for refurbishment). This will require careful control of operations so that any contaminated process working areas and storage tanks are appropriately decommissioned and contaminated materials suitably removed to licensed waste disposal facilities. It is recommended that removal is supervised and that sampling and validation is carried out to confirm that the operations have been suitably completed. In order to accurately delineate the contaminated areas it is recommended that a topographical survey of the exploration points be undertaken prior to demolition of the existing structures.
- 2) It is likely that some building materials and surface concrete within most of the works will be suitable for crushing and re-use on site. Visual and olfactory assessment of materials should be carried out and those with indications of hydrocarbons and solvents should be segregated and removed from the site to a licensed disposal facility.
- 3) A building material survey of the site has not been completed by ENSR. An asbestos survey should be carried out and all areas of asbestos containing material identified and recorded. Any identified asbestos materials should be segregated from other materials during demolition and disposed of at suitably licensed facilities. These operations should be subject to a detailed method statement to be prepared by the licensed asbestos removal contractors to carry out the works.
- 4) Within the APC areas the investigation has highlighted the presence of elevated concentrations of petroleum and aromatic hydrocarbons. The exact extent of the contaminated areas can only be fully established at the time of site decommissioning after demolition of the structures, pulling of underground storage

tanks and removal of the concrete slabs. At this stage an allowance should be made for removal of contaminated soils and groundwater and for validation of these operations. It will be necessary to excavate the full depth of made ground at these locations and pump out any contaminated groundwater where encountered. In addition there should be a contingency for further excavation into the underlying natural soils should the validation testing require this.

- 5) Phenols have been detected in the made ground at one location outside those areas also contaminated with other organic determinants (and recommended for remediation). The concentration in soil is marginally above the quoted threshold criteria but below the leachability criteria indicating that it is not likely to be mobile. This hotspot area will be required to be excavated and removed.
- 6) Where organic contaminants are to be removed off site it is recommended that on site screening be carried out during the excavation and removal using in-situ testing equipment. This will provide information on which to classify the waste for disposal purposes and will also control the extent of the excavation volumes (and costs) for landfilling.
- 7) In addition to the organic contamination testing of the soils on site has shown metals, sulphate, and cyanide (one location) impact at concentrations exceeding the quoted guidance. Leachability testing has, however, shown that these determinants are generally not mobile with the majority of results below the Environment Agency leachate quality threshold. The material which does not exceed the leachate threshold can be retained on site subject to agreement with the regulatory authorities and provision of suitable cover material in garden and landscaped areas.
- 8) As development proceeds excavations for foundations and services will produce arisings comprising both made ground and underlying natural soils. These materials may be placed over the surface around the excavations to make up ground levels reduced after removal of hardstandings. The placement of these arisings would be supervised in order to ensure that a visual assessment of all arisings is completed and any materials which are visually considered inappropriate can be separately stockpiled and tested. The laboratory analyses would be used to confirm whether the materials may be kept on site and taken for off site disposal. It will be necessary to provide a covering topsoil layer to all gardens and areas of public open space. It is recommended that 0.5m of topsoil be adopted for all rear gardens. This could be reduced for front gardens and areas of public open space. Agreement on the thickness of topsoil cover will be required with the regulatory authorities. Based upon inspection and chemical analysis, natural uncontaminated soils excavated from the site will be suitable as

a bulk infill material on site. It should be ensured, however, that any natural soils excavated beneath the APCs are not contaminated before they are used. For areas of uncontaminated natural ground there will be no requirement for provision of a covering topsoil layer (unless required for plant vegetation growth).

- 9) Methane and carbon dioxide levels in a number of the monitoring boreholes exceeded the recognised guideline values. Gas flow rates were, however, generally low indicating low gas production rates. As the areas with measurable gas concentrations cover a relatively small proportion of the site and also have the most difficult ground conditions for foundation installation it is recommended that they be used as areas of public open space car parking or amenity. Such areas will be required on any housing development by the local authority Planning Department. Subject to the findings of additional gas monitoring prior to development, gas ingress protection measures are recommended to be incorporated into the floor construction of any proposed dwellings in the vicinity of these gassing areas. This would include an enhanced polythene damp proof membrane into the floor slabs to provide resistance to gas entry. To achieve this it will be necessary properly to seal all joints and any through slab service entries. When practical, the dwellings should incorporate a ventilated sub floor void.
- 10) Standard hygiene measures should be adopted for all site operatives during development. A formal method statement for controlling operations during remediation works will be produced.
- 11) In respect to building materials advice should be obtained from the appropriate utility companies in respect of any specific requirements they may have for the made ground on-site. In particular the requirement to protect water mains against hydrocarbons requires the use of specific material types.

15.1 MATERIAL EXCAVATED FROM THE SITE

As outlined above both petroleum hydrocarbon and aromatic hydrocarbon impacted materials will be required to be removed off site or treated. Some of this material may require disposal as special waste where the concentration of total hydrocarbons is greater than 1000ppm. Interpretation of the Special Waste regulations is somewhat subjective and consequently consultation will need to be held with the Environmental Agency in respect to waste classification. In the meantime however it would be prudent to allow for special waste prices when preparing budgets.

Based upon the investigations described above a rough estimation of the likely volumes of material requiring remediation at the various APCs are given in Table 14.1 below

Table 14.1 Estimate of Soil Volumes Requiring Remediation

APC	Description	Estimated Volume of Soil Requiring Remediation (m3)
	Organic impacted areas	
1	Underground storage tanks	200
2	Antifreeze mixing area	25
7	Diesel above ground storage tank AST	25
9	Fuel (heating oil) ASTs	10
15	AST (former contents not known)	50
19	Office (for underground storage tanks	100
20 & 21	Solvent drum filling and recovery plant	200
22	Drum Crushing Plant	10
31	Infilled ground to south of the reservoir	40
	Total Volume	660
	Metals/ non organic impacted areas	
PH14	General site area	25
APC 17	Tetrosyl resin room	50
	Total Volume	75

It must be stressed that these quantities are only approximations based upon the findings of this investigation. The actual quantities can only be confirmed as the areas are remediated. Furthermore it is possible that additional areas of contamination may be identified as the development proceeds. The investigations have, however, provided evidence that additional widespread contamination is unlikely to occur.

If any other materials are visually assessed as contaminated (i.e. within service runs through areas of made ground for example) and require removal from site either the chemical analytical data within this report should be used to assess the requirements for waste disposal or these materials should be stockpiled and subject to representative sampling and laboratory analyses prior to removal from the site.

All materials removed off site should be documented and taken by licensed carriers to suitably licensed disposal facilities.

Since the wastes described above require to be removed to render the site suitable for development, they should be subject to landfill tax exemption. An application will however have to be made including quantities of material to be removed.

16. CHEMICAL ATTACK ON BURIED CONCRETE

The pH and sulphate testing was carried out to determine the design of buried concrete in accordance with Building Research Establishment Digest 363⁽⁵⁾.

The results of the chemical analyses given in Tables 2, carried out on representative soil samples generally indicate slightly elevated total soluble concentrations associated with near neutral or slightly alkaline pH values.

In accordance with the BRE Digest, given the nature of the made ground encountered on site is such that it would in part be considered mobile to groundwater, it is considered that deterioration of good quality ordinary Portland cement concrete, due to sulphate attack remains a possibility. As a precautionary measure all buried concrete should be designed to Class 2 conditions as outlined in BRE Digest 363. It is recommended that once the site is cleared and a final layout produced that additional soil sampling and testing are carried out to determine requirements for buried concrete in specific areas.

17. REFERENCES

1. Geological Survey of Great Britain (England and Wales), Sheet 85 Manchester, Scale: 1:50,000.
2. EA Policy and Protection of Groundwater Sheet 11, South Pennines, 1997
3. National Rivers Authority, "Policy and Practice for the Protection of Groundwater", Regional Appendix
4. NHBC, Chapter 4.2 Building Near Trees
5. Building Research Establishment Digest 363: Sulphate and Acid Resistance of Concrete in the Ground
6. Interdepartmental Committee on Contaminated Land. Guidance on the Assessment and Redevelopment of Contaminated Land. ICRCL 59/83, Second Edition, Department of the Environment, London, 1987.
7. Circular on Intervention Values for Soil Remediation, Dutch Ministry of Housing, DBO/07494013 dated 9 May 1994, as revised
8. Waste Management Paper No 27, Landfill Gas, HMSO 1994.
9. The Building Regulations, Approved Document C (1992 Edition), Department of the Environment and the Welsh Office.
10. Environment Agency, Interim Guidance on the Disposal of Contaminated Soil, 1997.

TABLES

Location	CH ₄ (% v/v)		CO ₂ (% v/v)		O ₂ (% v/v)		Hydrocarbon (ppm)		Flow Rate (l/hr)	DTW (m)
	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady		
BH1	<0.1	<0.1	8.0	8.1	7.8	7.2	0.2	0.2	N/R	No water
BH2	0.2	0.2	0.8	0.8	17.0	17.0	0.9	<0.1	N/R	2.54
BH3	<0.1	<0.1	<0.1	<0.1	18.8	18.8	0.9	0.9	N/R	1.96
BH4	<0.1	<0.1	1.5	0.8	16.4	16.4	17.2	2.5	0.1	2.30
BH5	<0.1	<0.1	<0.1	<0.1	18.7	18.7	<0.1	<0.1	N/R	1.08
BH9	<0.1	<0.1	<0.1	<0.1	18.6	18.6	0.8	0.8	N/R	11.80
BH10	39.4	38.3	2.2	2.1	3.9	4.8	0.9	0.9	1.5	4.62
BH11	0.4	0.1	<0.1	<0.1	18.6	18.6	<0.1	<0.1	N/R	2.41
PH7	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
PH9	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
PH10	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
PH24	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
PH42	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R

Table 1a: Results of Gas Monitoring – 01/11/02

Notes:

Equipment Used: Infra red Gas Analyser / Mass Balance Flow Transducer / PID / Interface Probe
 Serial number: MA007 / MA009 / MA023 / MA014
 Atmospheric Pressure: 997 mB
 Weather: Wet
 / Denotes initial / steady flow rate (average flow rate taken over 50 seconds)
 DTW: Depth to Water
 N/R: Not Recorded
 Gas concentration exceeds 1.5% by volume (CO₂) or 1.0% by volume (CH₄)

Location	CH ₄ (% v/v)		CO ₂ (% v/v)		O ₂ (% v/v)		Hydrocarbon (ppm)		Flow Rate (l/hr)	DTW (m)
	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady		
BH1	0.1	0.1	<0.1	<0.1	18.7	18.7	1.7	0.5	-0.6 / -0.5	3.19
BH2	0.1	0.1	0.4	0.4	18.3	18.4	0.5	0.5	-0.7	2.54
BH3	0.1	0.1	1.4	1.4	15.4	15.4	0.2	0.2	<0.1	1.94
BH4	0.2	0.2	2.6	1.8	13.5	14.8	1.6	1.1	N/R	2.19
BH5	1.1	1.1	1.3	1.3	15.5	15.5	6.0	0.9	-0.5 to 0.3 (ave -0.1)	1.05
BH9	0.1	0.1	0.1	0.1	18.7	18.7	1.5	1.0	0.1 / <0.1	11.68
BH10	41.2	39.0	2.7	2.6	4.9	4.9	3.7	<0.1	0.7 / 0.6	4.68
BH11	0.1	0.1	0.5	0.5	18.1	18.1	6.7	0.8	-0.6 / -0.5	1.97
PH7	0.1	0.1	0.3	0.3	18.6	18.6	22.0	22.0	0.4 / 0.3	Dry
PH9	0.1	0.1	2.0	2.0	17.1	17.1	2.5	0.3	-5.9 / -0.1	4.96
PH10	0.1	0.1	4.2	3.8	13.2	13.8	5.4	5.4	0.1 / <0.1	Dry
PH24	2.2	2.2	6.7	6.7	<0.1	<0.1	<0.1	<0.1	0.1 / <0.1	2.57
PH42	0.4	0.3	0.6	0.4	18.5	18.6	43.1	43.1	-0.2 / <0.1	0.97

Table 1b: Results of Gas Monitoring – 05/11/02

Notes:

Equipment Used: Infra red Gas Analyser / Mass Balance Flow Transducer / PID / Interface Probe
 Serial number: MA007 / MA009 / MA023 / MA014
 Atmospheric Pressure: 1007 mB
 Weather: Damp, still, mild
 / Denotes initial / steady flow rate (average flow rate taken over 50 seconds)
 DTW: Depth to Water
 N/R: Not Recorded
 Gas concentration exceeds 1.5% by volume (CO₂) or 1.0% by volume (CH₄)

Location	CH ₄ (% v/v)		CO ₂ (% v/v)		O ₂ (% v/v)		Flow Rate (l/hr)
	Initial	Steady	Initial	Steady	Initial	Steady	
BH1	<0.1	<0.1	<0.1	<0.1	18.4	18.4	0.3
BH2	1.0	1.6	0.1	0.1	18.4	18.4	<0.1
BH3	<0.1	<0.1	<0.1	<0.1	18.7	18.7	<0.1
BH4	<0.1	0.1	3.3	1.5	16.6	15.3	0.3
BH5	<0.1	<0.1	0.7	0.7	16.7	16.7	<0.1
BH9	<0.1	<0.1	<0.1	<0.1	18.6	18.6	<0.1
BH10	33.7	23.4*	2.5	1.7*	5.9	9.6*	<0.1
BH11	<0.1	0.1	0.5	0.5	18.1	18.1	0-1.2**
PH7	<0.1	<0.1	0.3	0.3	18.5	18.5	0.5
PH9	<0.1	<0.1	<0.1	<0.1	18.4	18.4	<0.1
PH10	<0.1	<0.1*	2.8	4.0*	13.1	14.0*	<0.1
PH24	1.2	1.2	3.0	1.2	9.6	13.8#	<0.1
PH42	5.0	1.7***	6.1	1.9***	16.3	17.2***	<0.1

Table 1c: Results of Gas Monitoring – 12/11/02

Notes:

Equipment Used: Infra red Gas Analyser / Mass Balance Flow Transducer / PID / Interface Probe
 Serial number: MA007 / MA009 / MA023 / MA014
 Atmospheric Pressure: 982 mB
 Weather: Wet, brightening up
 / Denotes initial / steady flow rate (average flow rate taken over 50 seconds)
 # Value still increasing
 * Value after 5 minutes
 ** Fluctuating between values
 *** Value after 3 minutes
 Gas concentration exceeds 1.5% by volume (CO₂) or 1.0% by volume (CH₄)

Location	CH ₄ (% v/v)		CO ₂ (% v/v)		O ₂ (% v/v)		Flow Rate (l/hr)
	Initial	Steady	Initial	Steady	Initial	Steady	
TP9	<0.1	<0.1	0.3	0.3	20.1	20.1	0.9 / 0.2
BH10	42.8	30.0	3.1	2.2	4.5	8.3	1.9 / 1.4
PH7	<0.1	<0.1	0.2	0.2	20.1	20.2	3.2 / 2.9
PH9	<0.1	<0.1	1.9	1.9	18.8	18.8	<0.1
PH10	<0.1	<0.1	11.3	9.5	3.8	7.0	-0.5 to 1.1 / <0.1
PH24	<0.1	<0.1	1.0	0.7	19.9	20.0	-0.3 / <0.1
PH29	<0.1	<0.1	5.9	5.9	12.0	12.1	-0.3 / <0.1
PH35	<0.1	<0.1	2.0*	1.0*	18.8*	19.1*	-0.9 / -0.3
PH42	7.4	7.4	13.3	13.3	14.7	14.7	36.5 / 0.1*

Table 1d: Results of Gas Monitoring – 20/11/02

Notes:

Equipment Used: Infra red Gas Analyser / Mass Balance Flow Transducer
 Serial number: MA008 / MA009
 Atmospheric Pressure: 983 mB
 Weather: Rainy, cold
 / Denotes initial / steady flow rate (average flow rate taken over 50 seconds unless stated otherwise)
 * Actual flow rate after 60 seconds recovery period
 ** Fluctuating between values
 Gas concentration exceeds 1.5% by volume (CO₂) or 1.0% by volume (CH₄)

Location	BH10		
Sample Date	20/11/02 *	20/11/02 **	20/11/02 ***
Hydrogen	<0.5	-	-
Oxygen	7.1	-	-
Nitrogen	53.6	-	-
Carbon Monoxide	<0.05	57	-
Methane	37.1	-	370,860
Carbon Dioxide	2.2	-	-
Hydrogen Sulphide	-	<1	-
Ethane	-	-	9
Propane	-	-	<1
Isobutane	-	-	<1
Butane	-	-	<1
Isopentane	-	-	<1
Pentane	-	-	<1
Hexane	-	-	2
Heptane	-	-	<1

Table 1e: Results of Laboratory Analyses on Gas Sample (BH10)

Notes:

- * Denotes analyses carried out using the G.C. Suite (results in % by volume)
- ** Denotes analyses carried out using the Exotox Meter (results in ppm)
- *** Denotes analyses carried out using the G.C. / FID Meter (results in ppm)

Location	PH1	PH5	PH6	PH7	PH9	PH9	Appropriate Threshold Concentrations	
Sample Depth (m)	0.15-0.25	0.19-0.50	1.6-1.7	1.0-2.0	1.4-1.5	0.8-0.9	A	B
pH, units	8.27	-	5.07	7.73	5.71	5.48	5.0 min*	5.0 min*
Arsenic	32	-	5	16	3	25	20	20
Cadmium (soil pH dependent)	<1	-	<1	<1	<1	<1	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	977	-	22	16	16	17	130*	200*
Chromium (Hexavalent)	<0.1	-	-	-	-	-	130*	200*
Lead	61	-	82	42	14	23	450*	450*
Mercury	<1	-	<1	<1	<1	<1	8*	15*
Selenium	3	-	3	2	2	2	35*	260*
Copper	76	-	47	52	26	108	130**	130**
Nickel	27	-	20	24	15	16	50*	75*
Zinc	292	-	61	41	55	12	300**	300**
Boron (water soluble)	<1	-	181	3	3	2	3**	3**
Sulphate	1220	-	915	1716	1265	7093	2000**	2000**
Water soluble sulphate as SO4 (g/l)	-	-	-	-	-	0.399	No Guidance	No Guidance
Phenols	<0.01	-	0.01	<0.01	<0.01	<0.01	5**	5**
Sulphide	<10	-	<10	<10	<10	<10	250**	250**
Cyanide (total)	24.9	-	<2.5	<2.5	<2.5	4.3	25**	25**
Solvent Extractable Matter (SEM)	168	-	149	154	96	113	50***	5000***
TPH	-	-	-	-	-	-	50***	5000***
Benzene	-	-	-	-	-	-	0.01***	1***
Toluene	-	-	-	-	-	-	0.01***	130***
Ethylbenzene	-	-	-	-	-	-	0.03***	50***
Xylene	-	-	-	-	-	-	0.1***	25***
PCB	-	<0.05	-	-	-	-	0.02***	1***
PAH (total)	-	-	-	-	-	-	1***	40***
VOC	-	-	-	-	-	-	-	-

Table 2: Results of Analyses on Soil Samples

Notes:

A – CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B – CLEA Guideline Value (Residential —no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise



Exceeds threshold value A

Location	PH10	PH10	PH11	PH12	Appropriate Threshold Concentrations	
Sample Depth (m)	0.6-0.7	1.7-1.8	0.8-0.9	0.5	A	B
pH, units	-	7.23	7.97	7.54	5.0 min*	5.0 min*
Arsenic	-	43	70	2	20	20
Cadmium (soil pH dependent)	-	1	<1	<1	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	-	28	119	13	130*	200*
Chromium (Hexavalent)	-		<0.1		130*	200*
Lead	-	57	208	10	450*	450*
Mercury	-	<1	<1	<1	8*	15*
Selenium	-	<1	<1	2	35*	260*
Copper	-	71	207	15	130**	130**
Nickel	-	29	75	16	50*	75*
Zinc	-	42	341	44	300**	300**
Boron (water soluble)	-	3	1	1	3**	3**
Sulphate	-	740	1401	490	2000**	2000**
Water soluble sulphate as SO ₄ (g/l)	-	-	-	-	No Guidance	No Guidance
Phenols	-	<0.01	<0.01	5.27	5**	5**
Sulphide	-	<10	<10	<10	250**	250**
Cyanide (total)	-	<2.5	<2.5	<2.5	25**	25**
Solvent Extractable Matter (SEM)	-	128	151	162	50***	5000***
TPH	>4,000	-	-	-	50***	5000***
Benzene	<0.1	-	-	-	0.01***	1***
Toluene	0.5	-	-	-	0.01***	130***
Ethylbenzene	0.6	-	-	-	0.03***	50***
Xylene	1.4	-	-	-	0.1***	25***
PCB		-	-	-	0.02***	1***
PAH (total)		-	-	-	1***	40***
VOCs		-	-	All <1	-	-

Table 2 (cont.): Results of Analyses on Soil Samples

Notes:

A – CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B – CLEA Guideline Value (Residential –no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise

 Exceeds threshold value A

Location	PH14	PH15	PH16	PH17	PH17	Appropriate Threshold Concentrations	
Sample Depth (m)	0.3	0.2	0.4	0.8-1.0	2.4-2.6	A	B
pH, units	8.31	-	-	7.06	-	5.0 min*	5.0 min*
Arsenic	10	-	-	8	-	20	20
Cadmium (soil pH dependent)	<1	-	-	<1	-	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	20	-	-	22	-	130*	200*
Chromium (hexavalent)	-	-	-	-	-	130*	200*
Lead	270	-	-	38	-	450*	450*
Mercury	<1	-	-	<1	-	8*	15*
Selenium	<1	-	-	2	-	35*	260*
Copper	53	-	-	35	-	130**	130**
Nickel	29	-	-	20	-	50*	75*
Zinc	76	-	-	43	-	300**	300**
Boron (water soluble)	15	-	-	<1	-	3**	3**
Sulphate	3706	-	-	694	-	2000**	2000**
Water soluble sulphate as SO ₄ (g/l)	0.942	-	-	-	-	No Guidance	No Guidance
Phenols	0.27	-	-	<0.01	-	5**	5**
Sulphide	15	-	-	<10	-	250**	250**
Cyanide (total)	436.9	-	-	<2.5	-	25**	25**
Solvent Extractable Matter (SEM)	289	-	-	133	-	50***	5000***
TPH	-	1200	830	-	170	50***	5000***
Benzene	-	<0.1	0.1	-	<0.1	0.01***	1***
Toluene	-	0.4	<0.1	-	0.8	0.01***	130***
Ethylbenzene	-	0.2	<0.1	-	1.4	0.03***	50***
Xylene	-	0.8	<0.1	-	2.0	0.1***	25***
PCB	-	-	-	-	-	0.02***	1***
PAH (total)	-	-	-	-	-	1***	40***
VOC	-	-	-	-	-	-	-

Table 2 (cont.): Results of Analyses on Soil Samples

Notes:

A – CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B – CLEA Guideline Value (Residential –no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise

 Exceeds threshold value A

Location	PH18	PH21	PH21	PH22	PH23	Appropriate Threshold Concentrations	
Sample Depth (m)	1.6-1.8	0.5-0.6	1-1.1	1.7	1.2	A	B
pH, units	-	8.25	-	7.23	6.21	5.0 min*	5.0 min*
Arsenic	-	84	-	18	2	20	20
Cadmium (soil pH dependent)	-	<1	-	<1	<1	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	-	269	-	102	23	130*	200*
Chromium (Hexavalent)	-	<0.1	-	<0.1	-	130*	200*
Lead	-	1528	-	112	19	450*	450*
Mercury	-	<1	-	<1	<1	8*	15*
Selenium	-	<1	-	2	<1	35*	260*
Copper	-	336	-	57	24	130**	130**
Nickel	-	80	-	25	14	50*	75*
Zinc	-	312	-	56	54	300**	300**
Boron (water soluble)	-	2	-	<1	<1	3**	3**
Sulphate	-	5990	-	801	642	2000**	2000**
Water soluble sulphate as SO ₄ (g/l)	-	0.930	-	-	-	No Guidance	No Guidance
Phenols	-	0.02	-	<0.01	<0.01	5**	5**
Sulphide	-	<10	-	<10	<10	250**	250**
Cyanide (total)	-	<2.5	-	<2.5	<2.5	25**	25**
Solvent Extractable Matter (SEM)	-	335	-	77	52	50***	5000***
TPH	<10	-	-	-	-	50***	5000***
Benzene	-	-	-	-	-	0.01***	1***
Toluene	-	-	-	-	-	0.01***	130***
Ethylbenzene	-	-	-	-	-	0.03***	50***
Xylene	-	-	-	-	-	0.1***	25***
PCB	-	-	-	-	-	0.02***	1***
PAH (total)	<0.1	-	-	-	-	1***	40***
VOC	-	-	All <0.1	-	-	-	-

Table 2(cont.): Results of Analyses on Soil Samples

Notes:

A – CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B – CLEA Guideline Value (Residential —no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise

 Exceeds threshold value A

Location	PH24	PH25	PH28	PH30	PH32	Appropriate Threshold Concentrations	
Sample Depth (m)	1.0	1.5-1.6	1.3-1.5	0.3-0.5	1.6-1.8	A	B
pH, units	6.48	6.42	7.79	-	-	5.0 min*	5.0 min*
Arsenic	5	3	30	-	-	20	20
Cadmium (soil pH dependent)	<1	<1	<1	-	-	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	16	17	18	-	-	130*	200*
Chromium (hexavalent)	-	-	-	-	-	130*	200*
Lead	23	16	224???	-	-	450*	450*
Mercury	<1	<1	<1	-	-	8*	15*
Selenium	2	2	1	-	-	35*	260*
Copper	25	24	118	-	-	130**	130**
Nickel	11	25	27	-	-	50*	75*
Zinc	48	62	120	-	-	300**	300**
Boron (water soluble)	<1	3	1	-	-	3**	3**
Sulphate	687	511	2966	-	-	2000**	2000**
Water soluble sulphate as SO ₄ (g/l)	-	-	0.002	-	-	No Guidance	No Guidance
Phenols	<0.01	0.01	0.73	-	-	5**	5**
Sulphide	<10	<10	<10	-	-	250**	250**
Cyanide (total)	4.99	<2.5	<2.5	-	-	25**	25**
Solvent Extractable Matter (SEM)	56	84	344	-	-	50***	5000***
TPH	-	-	-	13	<10	50***	5000***
Benzene	-	-	-	<0.1	<0.1	0.01***	1***
Toluene	-	-	-	1.0	<0.1	0.01***	130***
Ethylbenzene	-	-	-	0.1	0.1	0.03***	50***
Xylene	-	-	-	2.4	<0.1	0.1***	25***
PCB	-	-	-	-	-	0.02***	1***
PAH (total)	-	-	-	-	-	1***	40***
VOC	-	-	-	All <1	All <0.1	-	-

Table 2 (cont.): Results of Analyses on Soil Samples

Notes:

A – CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B – CLEA Guideline Value (Residential –no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise

 Exceeds threshold value A

Location	PH35	PH36	PH37	BH4	BH6	Appropriate Threshold Concentrations	
Sample Depth (m)	1.8-1.9	3.7-3.8	1.7-1.9	3.0-3.1	1.5-1.95	A	B
pH, units	-	7.28	-	-	-	5.0 min*	5.0 min*
Arsenic	-	10	-	-	-	20	20
Cadmium (soil pH dependent)	-	<1	-	-	-	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	-	25	-	-	-	130*	200*
Chromium (hexavalent)	-	-	-	-	-	130*	200*
Lead	-	138	-	-	-	450*	450*
Mercury	-	<1	-	-	-	8*	15*
Selenium	-	2	-	-	-	35*	260*
Copper	-	48	-	-	-	130**	130**
Nickel	-	17	-	-	-	50*	75*
Zinc	-	148	-	-	-	300**	300**
Boron (water soluble)	-	14	-	-	-	3**	3**
Sulphate	-	958	-	-	-	2000**	2000**
Water soluble sulphate as SO ₄ (g/l)	-	-	-	-	-	No Guidance	No Guidance
Phenols	-	0.29	-	-	-	5**	5**
Sulphide	-	32	-	-	-	250**	250**
Cyanide (total)	-	<2.5	-	-	-	25**	25**
Solvent Extractable Matter (SEM)	-	133	-	-	-	50***	5000***
TPH	10	<10	38	200	<10	50***	5000***
Benzene	<0.1	<0.1	0.1	<0.1	<0.1	0.01***	1***
Toluene	<0.1	<0.1	7.9	0.5	<0.1	0.01***	130***
Ethylbenzene	0.4	0.6	2.5	26	<0.1	0.03***	50***
Xylene	<0.1	<0.1	14	92	<0.1	0.1***	25***
PCB	-	-	-	-	-	0.02***	1***
PAH (total)	-	-	-	-	-	1***	40***
VOC	All <0.1	All <0.1	All <1	-	All <0.1	-	-

Table 2 (cont.): Results of Analyses on Soil Samples

Notes:

A – CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B – CLEA Guideline Value (Residential —no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise



Exceeds threshold value A

Location	PH40	PH42	TP6	TP1	TP3	Appropriate Threshold Concentrations	
Sample Depth (m)	1.0	1.7	1.0	0.6	0.6	A	B
pH, units	-	-	-	6.99	6.75	5.0 min*	5.0 min*
Arsenic	-	-	-	7	<1	20	20
Cadmium (soil pH dependent)	-	-	-	<1	<1	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	-	-	-	34	17	130*	200*
Chromium (hexavalent)	-	-	-	-	-	130*	200*
Lead	-	-	-	18	22	450*	450*
Mercury	-	-	-	<1	<1	8*	15*
Selenium	-	-	-	2	<1	35*	260*
Copper	-	-	-	34	18	130**	130**
Nickel	-	-	-	10	<1	50*	75*
Zinc	-	-	-	38	42	300**	300**
Boron (water soluble)	-	-	-	-	-	3**	3**
Sulphate	-	-	-	395	492	2000**	2000**
Water soluble sulphate as SO ₄ (g/l)	-	-	-	-	-	No Guidance	No Guidance
Phenols	-	-	-	<0.01	<0.01	5**	5**
Sulphide	-	-	-	<10	<10	250**	250**
Cyanide (total)	-	-	-	<2.5	<2.5	25**	25**
Solvent Extractable Matter (SEM)	-	-	-	2529	105	50***	5000***
TPH	<10	1600	22	-	-	50***	5000***
Benzene	<0.1	<0.1	<0.1	-	-	0.01***	1***
Toluene	<0.1	620	5.6	-	-	0.01***	130***
Ethylbenzene	<0.1	95	1.1	-	-	0.03***	50***
Xylene	<0.1	280	5.8	-	-	0.1***	25***
PCB	-	-	-	-	-	0.02***	1***
PAH (total)	-	-	-	-	-	1***	40***
VOC	All <0.1	All <1	-	-	-	-	-

Table 2 (cont.): Results of Analyses on Soil Samples

Notes:

A -- CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B -- CLEA Guideline Value (Residential --no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise

 Exceeds threshold value A

Location	TP5	TP6	TP7	PH38	PH41	Appropriate Threshold Concentrations	
Sample Depth (m)	1.0	0.6	0.6	0.4	0.8-0.9	A	B
pH, units	6.45	8.29	7.92	8.77	8.08	5.0 min*	5.0 min*
Arsenic	2	<1	18	7	22	20	20
Cadmium (soil pH dependent)	<1	<1	<1	<1	<1	pH6: 1* pH7: 2* pH8: 8*	30*
Chromium (total)	17	15	8	23	29	130*	200*
Chromium (hexavalent)	-	-	-	-	-	130*	200*
Lead	9	105	32	52	492	450*	450*
Mercury	<1	<1	<1	<1	<1	8*	15*
Selenium	2	<1	<1	2	<1	35*	260*
Copper	20	33	62	20	95	130**	130**
Nickel	15	13	20	26	30	50*	75*
Zinc	43	107	34	41	298	300**	300**
Boron (water soluble)	<1	1	<1	1	2	3**	3**
Sulphate	452	2380	813	456	1007	2000**	2000**
Water Sol sulphate as SO ₄ (g/l)	-	0.170	-	-	-	No Guidance	No Guidance
Phenols	<0.01	0.12	<0.01	<0.01	0.02	5**	5**
Sulphide	<10	<10	<10	<10	<10	250**	250**
Cyanide (total)	<2.5	<2.5	<2.5	<2.5	<2.5	25**	25**
Solvent Extractable Matter (SEM)	42	800	196	1803	775	50***	5000***
TPH	-	-	-	-	-	50***	5000***
Benzene	-	-	-	-	-	0.01***	1***
Toluene	-	-	-	-	-	0.01***	130***
Ethylbenzene	-	-	-	-	-	0.03***	50***
Xylene	-	-	-	-	-	0.1***	25***
PCB	-	-	-	-	-	0.02***	1***
PAH (total)	-	-	-	-	-	1***	40***
VOC	-	-	-	-	-	-	-

Table 2 (cont.): Results of Analyses on Soil Samples

Notes:

A – CLEA Guideline Value (Residential- plant uptake)*/ICRCL Domestic Threshold Trigger**/ Dutch Target Value***

B – CLEA Guideline Value (Residential —no plant uptake)*/ICRCL Open Space Threshold Trigger**/Dutch Intervention Value***

Results are quoted as mg/kg unless stated otherwise

 Exceeds threshold value A

Location	BH2 W2	BH2 W3	BH4 W1	BH5 W2	BH5 W3	BH6 W2	Guidance Value
pH, units	-	7.37	-	-	8.33	-	6.5 to 10 ^a
Arsenic (ppm)	-	<0.002	-	-	<0.002	-	0.01 ^a
Cadmium (ppb)	-	<0.4	-	-	<0.4	-	5 ^a
Chromium (total) (ppb)	-	1	-	-	1	-	50 ^a
Lead (ppb)	-	<0.5	-	-	<0.5	-	25 ^a
Mercury (ppb)	-	<0.05	-	-	<0.05	-	1 ^a
Selenium (ppm)	-	<0.05	-	-	<0.05	-	0.01 ^a
Copper (ppb)	-	<5	-	-	6	-	2000 ^a
Nickel (ppb)	-	<10	-	-	<10	-	20 ^a
Zinc (ppm)	-	<0.05	-	-	<0.05	-	-
Boron (ppm)	-	<0.05	-	-	<0.05	-	1 ^a
Soluble Sulphate (ppm)	-	52	-	-	24	-	250 ^a
Phenols (ppm)	-	<0.01	-	-	<0.01	-	-
Sulphide (ppm)	-	<0.1	-	-	<0.1	-	-
Cyanide (total) (ppm)	-	<0.05	-	-	<0.05	-	0.05 ^a
Solvent Extractable Matter (SEM) (ppm)	-	1	-	-	1	-	-
TPH (ppb)	<50	-	1600	<50	-	8,500	600 ^b
Benzene (ppb)	<2	-	<2	<2	-	18	30 ^b
Toluene (ppb)	<2	-	35	<2	-	8,300	1000 ^b
Ethylbenzene (ppb)	<2	-	550	<2	-	780	150 ^b
Xylene (ppb)	<2	-	1600	<2	-	1,900	70 ^b
VOC (Total)	All <5	-	All <5	All <5	-	All <5	-

Table 3: Results of Groundwater Samples Analysis

^a Water Supply Regulations, 2000 – Maximum Concentration

^b Dutch Intervention Value

 Exceeds threshold value

Location	PH42	BH9	B10	Guidance Value
pH, units	-	7.96	-	6.5 to 10 ^a
Arsenic (ppm)	-	0.003	-	0.01 ^a
Cadmium (ppb)	-	<0.4	-	5 ^a
Chromium (total) (ppb)	-	<1	-	50 ^a
Lead (ppb)	-	<5	-	25 ^a
Mercury (ppb)	-	<0.05	-	1 ^a
Selenium (ppm)	-	<0.05	-	0.01 ^a
Copper (ppb)	-	7	-	2000 ^a
Nickel (ppb)	-	<10	-	20 ^a
Zinc (ppm)	-	0.30	-	-
Boron (ppm)	-	0.25	-	1 ^a
Sulphate (ppm)	-	509	-	250 ^a
Phenols (ppm)	-	<0.01	-	-
Sulphide (ppm)	-	<0.1	-	-
Cyanide (total) (ppm)	-	<0.05	-	0.05 ^a
Solvent Extractable Matter (SEM) (ppm)	-	1	-	-
TPH (ppb)	26,945	-	<50	600 ^b
Benzene (ppb)	45	-	<2	30 ^b
Toluene (ppb)	21,000	-	<2	1000 ^b
Ethylbenzene (ppb)	1,500	-	6	150 ^b
Xylene (ppb)	4,400	-	18	70 ^b
VOC	All <1000*	-	All <5	-

Table 3: Results of Groundwater Samples Analysis

^a Water Supply Regulations, 2000 – Maximum Concentration

^b Dutch Intervention Value

* increased reporting limit due to sample size



Exceeds threshold value

Location	PH1	PH6	PH9	PH10	Leachate Quality Threshold#
Sample Depth (m)	0.15-0.25	1.6-1.7	0.8-0.9	1.7-1.8	
PH of leachate (pH units)	7.52	6.70	6.31	6.85	5.5-9.5
Boron on leachate	<0.05	8.47	<0.05	<0.05	2
Mercury in leachate (ppb)	0.05	<0.05	<0.05	<0.05	1
Cadmium in leachate (ppb)	<0.4	<0.4	<0.4	<0.4	1
Arsenic in leachate	<0.002	<0.002	<0.002	<0.002	0.01
Chromium in leachate (ppb)	23	<1	<1	<1	50
Copper in leachate (ppb)	<5	<5	<5	<5	20
Nickel in leachate (ppb)	<10	<10	<10	<10	50
Selenium in leachate	<0.05	<0.05	<0.05	<0.05	0.010
Lead in leachate (ppb)	<5	<5	<5	<5	50
Sulphide on leachate	<0.1	<0.1	<0.1	<0.1	150
Sulphate in leachate	36	13	34	<3	150
Zinc in leachate	<0.05	<0.05	<0.05	<0.05	0.5
Phenols in leachate	<0.01	<0.01	<0.01	<0.01	0.0005
Total cyanide in leachate	0.05	<0.05	<0.05	<0.05	0.05

Table 4: Results of Leachability Analysis on Soil Samples

Results are quoted as mg/kg (ppm) unless stated otherwise



Exceeds threshold value

Values from Environment Agency Interim Guidance on the Disposal of "Contaminated Soils" (01/05/97) – concentrations that would be acceptable as direct discharge to controlled waters in the vicinity of the disposal site.

Location	PH11	PH12	PH14	PH21	PH28	Leachate Quality Threshold
Sample Depth (m)	0.8-0.9	1.5	0.3	0.5-0.6	1.3-1.5	1.3-1.5
PH of leachate (pH units)	7.69	6.92	6.97	7.34	7.58	5.5-9.5
Boron on leachate	<0.05	<0.05	<0.05	<0.05	<0.05	2
Mercury in leachate (ppb)	<0.05	<0.05	<0.05	<0.05	<0.05	1
Cadmium in leachate (ppb)	<0.4	<0.4	<0.4	<0.4	<0.4	1
Arsenic in leachate	<0.002	<0.002	<0.002	<0.002	<0.002	0.01
Chromium in leachate (ppb)	<1	<1	1	30	<1	50
Copper in leachate (ppb)	<5	<5	<5	5	<5	20
Nickel in leachate (ppb)	<10	<10	<10	<10	<10	50
Selenium in leachate	<0.05	<0.05	<0.05	<0.05	<0.05	0.010
Lead in leachate (ppb)	<5	<5	<5	<18	<5	50
Beryllium in leachate	??????				<0.1	-
Sulphide on leachate	<0.1	<0.1	<0.1	<0.1	<0.1	150
Sulphate in leachate	16	4	157	90	4	150
Zinc in leachate	<0.05	<0.05	<0.05	<0.05	0.73	0.5
Phenols in leachate	<0.01	0.01	<0.01	<0.01	<0.01	0.0005
Total cyanide in leachate	<0.05	<0.05	0.99	<0.05	<0.05	0.05

Table 4: Results of Leachability Analysis on Soil Samples

Results are quoted as mg/kg unless stated otherwise

Values from Environment Agency Interim Guidance on the Disposal of "Contaminated Soils" (01/05/97) – concentrations that would be acceptable as direct discharge to controlled waters in the vicinity of the disposal site.



Exceeds threshold value

Location	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Natural Moisture Content (%)	Retained on 425 Micron Sieve (%)
TP10	1.50 – 1.70	38	20	18	21	23
BH1	0.50 – 1.00	36	22	14	23	25
BH6	1.00 – 1.50	31	18	13	20	21
BH10	1.50 – 2.00	N/A	N/A	Non-plastic	16	23

Table 5: Results of Plasticity Index Analyses

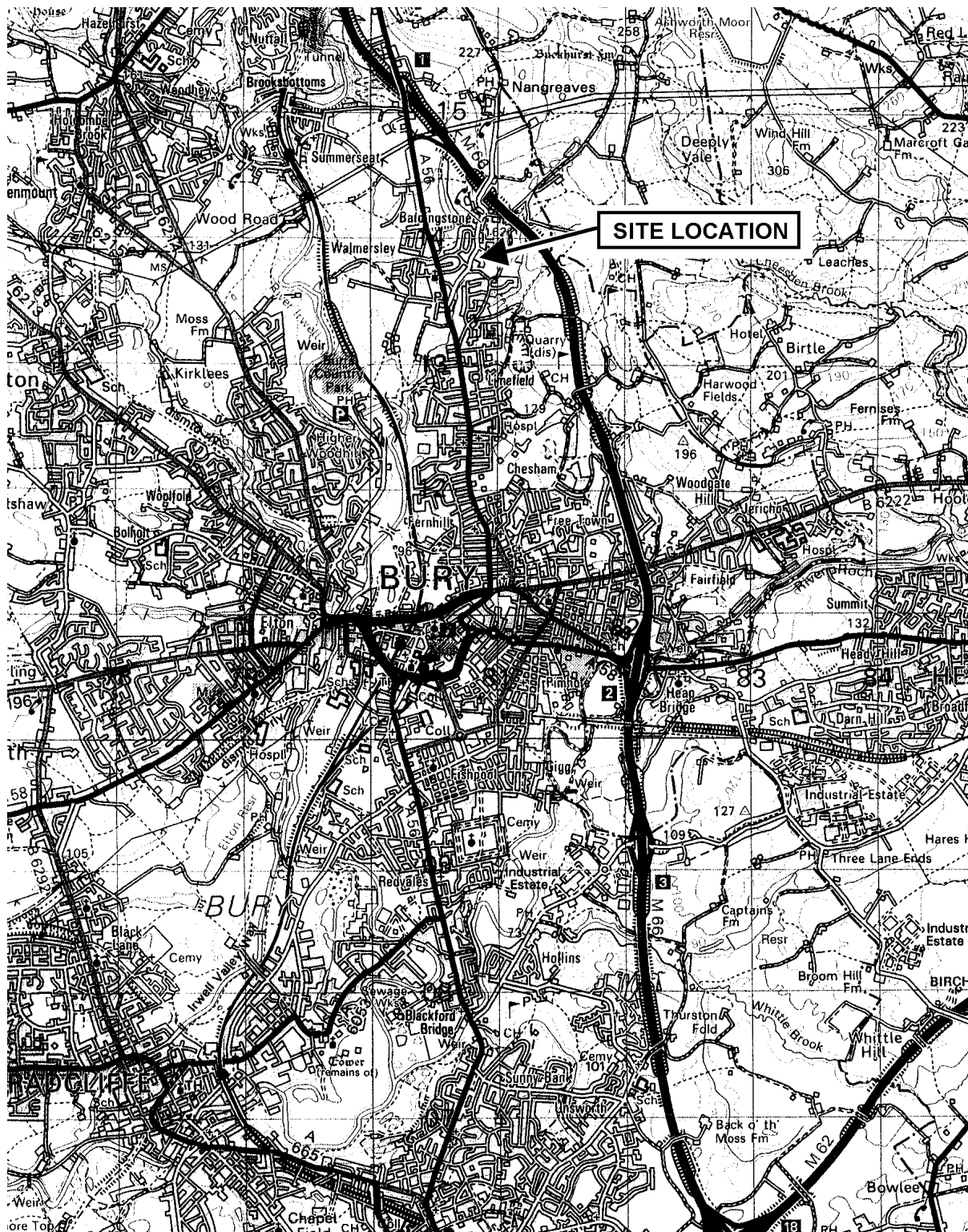
Location	Depth	Passing 2mm sieve (%)	Loss on Ignition (%)
TP7	2.00	56	14.0
BH9	1.00 – 3.00	83	5.1
BH11	1.00 – 1.45	81	7.1
PH29	1.50 – 1.70	76	6.7

Table 6: Results of Loss on Ignition Analysis

Location	Asbestos Type	Asbestos Content (%)
PH6	Amosite	15-50
PH14	Chrysotile	15-50
PH45	Non detected	N/A
PH26	Non detected	N/A
PH29	Amosite	0.08-0.15
	Chrysotile	0.08-0.15

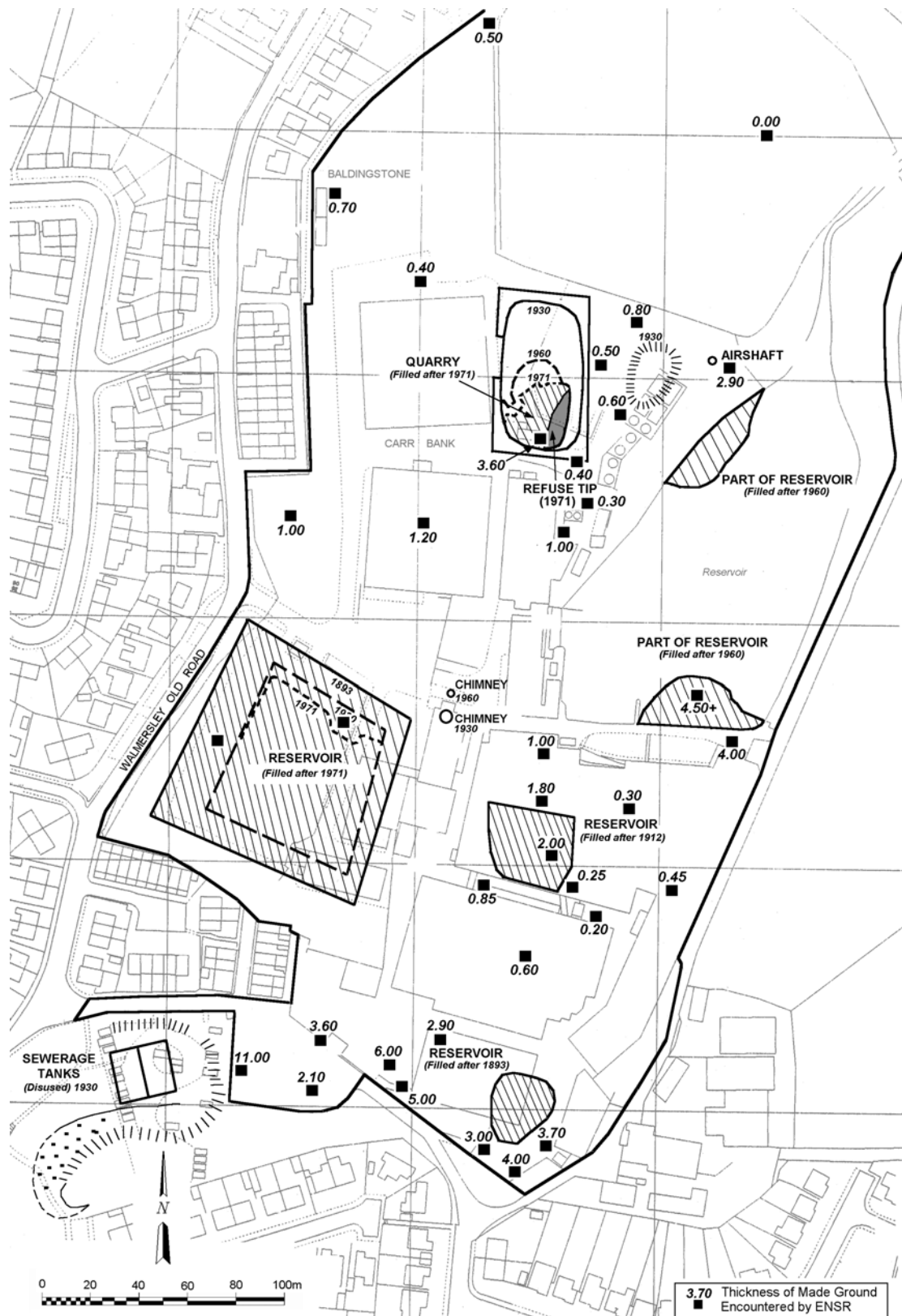
Table 7: Results of Asbestos Analysis

FIGURES

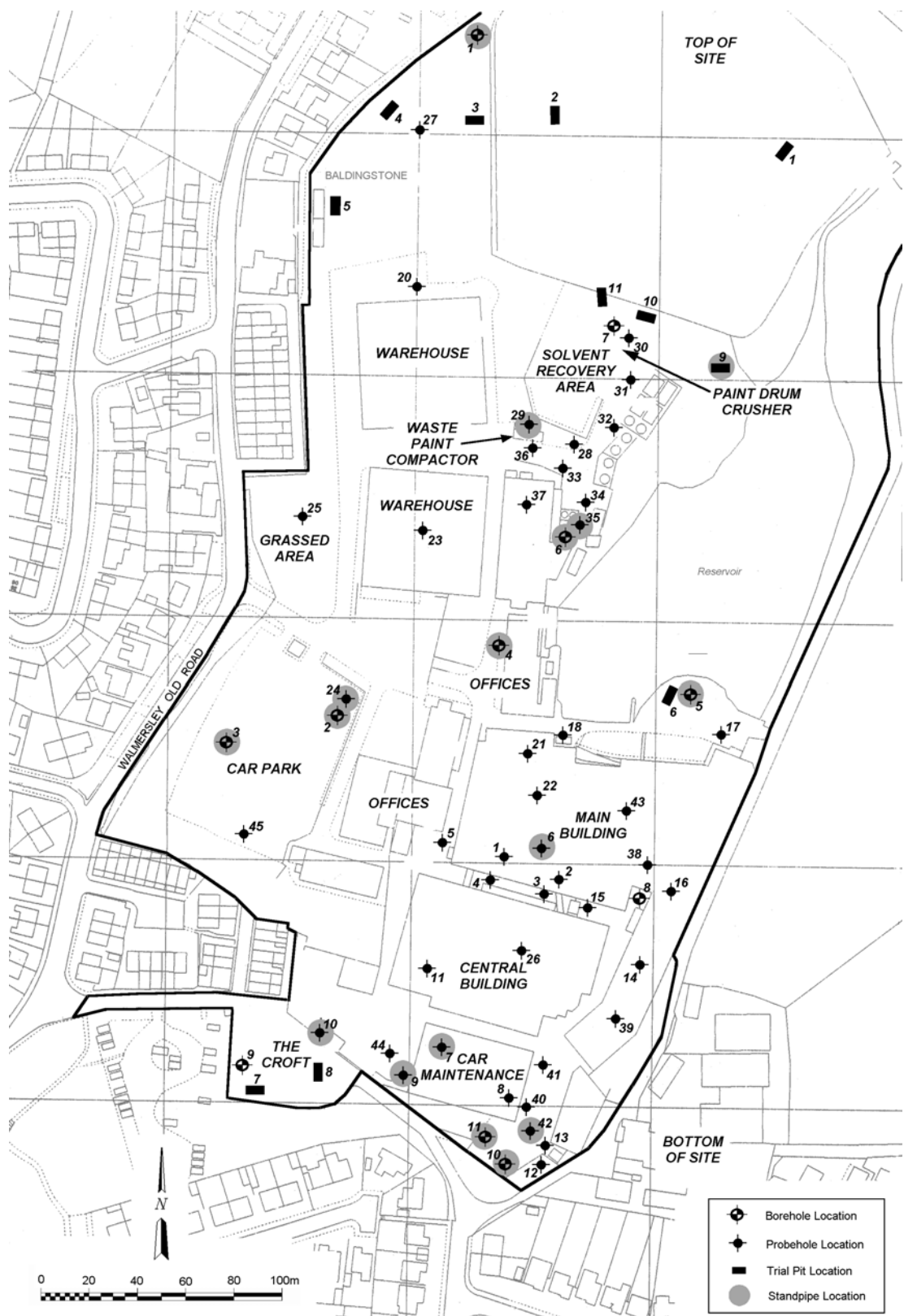


Reproduced from the 1996 Ordnance Survey 1:50,000 Scale Landranger Map 109, OSGR – SD 809 138
with the permission of the Controller of Her Majesty's Stationary Office, Crown Copyright. Licence No. AL 52022A
ENSR International Limited, 16 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RW.

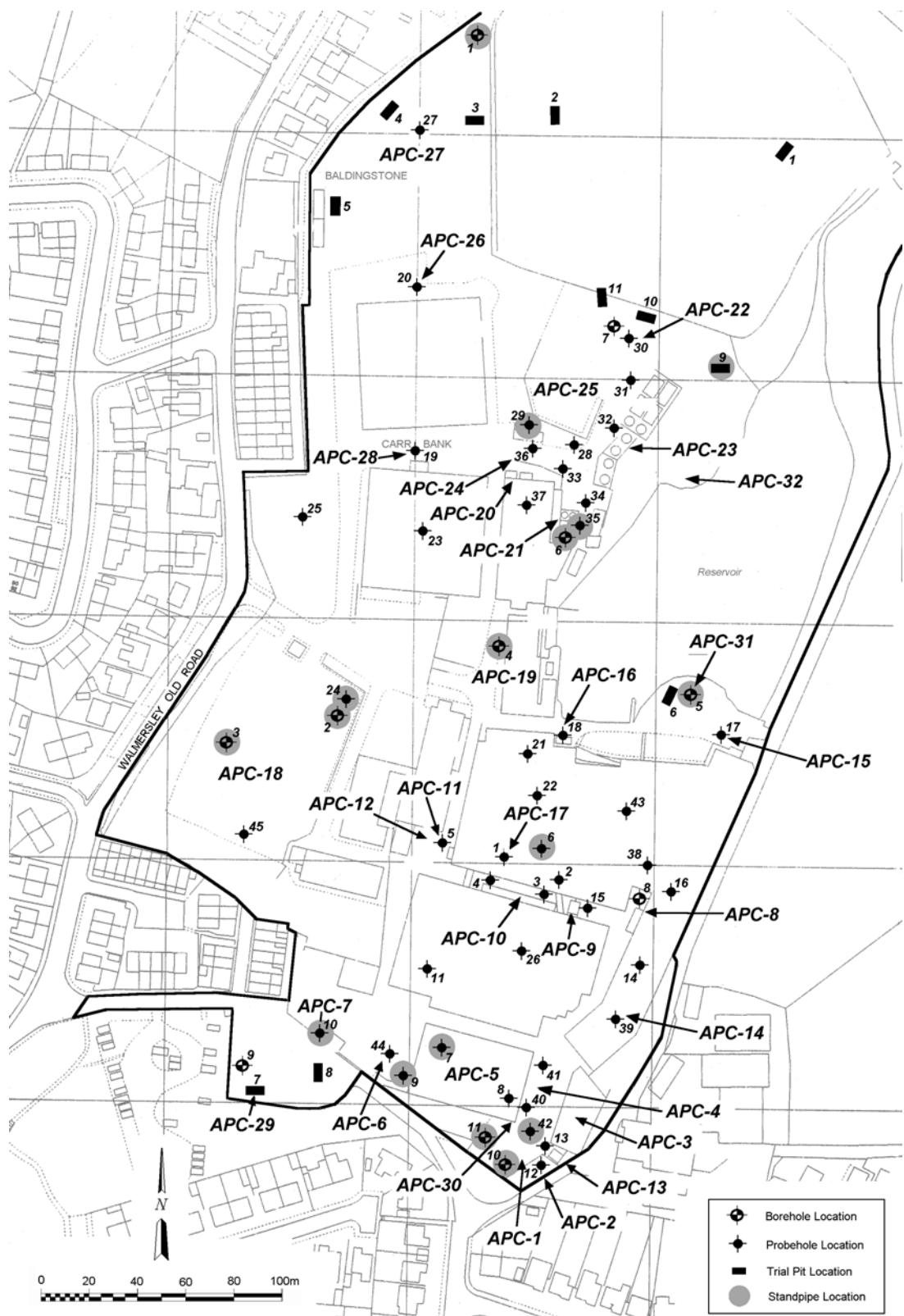
SITE LOCATION MAP



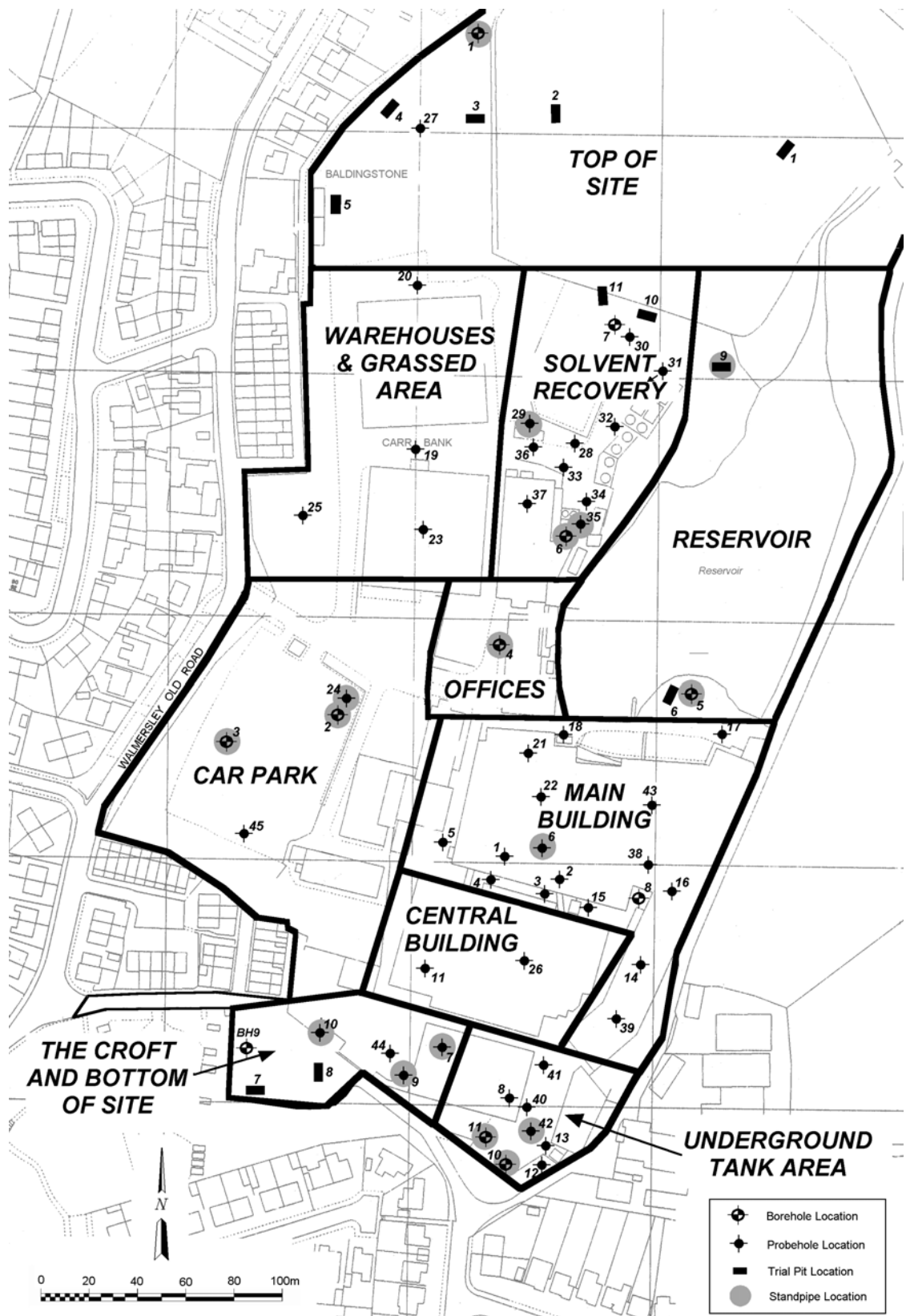
**SITE PLAN SHOWING HISTORICALLY FILLED AREAS
AND THICKNESS OF MADE GROUND ENCOUNTERED BY ENSR**



INVESTIGATION LOCATION PLAN



AREAS OF POTENTIAL CONCERN



SITE PLAN SHOWING AREAS FOR DISCUSSION

APPENDIX A

Service Constraints

**ENSR INTERNATIONAL LIMITED
SERVICE CONSTRAINTS**

1. This report and the Phase 1 and 2 Environmental Assessment carried out in connection with the report (together the "Services") were compiled and carried out by ENSR International Ltd (ENSR) for Tetrosyl (the "client") in accordance with the terms of a contract between ENSR and the "client". The Services were performed by ENSR with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by ENSR taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between ENSR and the client.
2. Other than that expressly contained in paragraph 1 above, ENSR provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed the Services were performed by ENSR exclusively for the purposes of the client. ENSR is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, ENSR does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and ENSR disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.
4. It is ENSR's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without ENSR's review and advice shall be at the client's sole and own risk. Should ENSR be requested to review the report after the date hereof, ENSR shall be entitled to additional payment at the then existing rates or such other terms as agreed between ENSR and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of ENSR. In the absence of such written advice of ENSR, reliance on the report in the future shall be at the client's own and sole risk. Should ENSR be requested to review the report in the future, ENSR shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between ENSR and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and ENSR. ENSR has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and ENSR. ENSR is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, ENSR did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.
7. The Services are based upon ENSR's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with ENSR's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which ENSR was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by ENSR and the observations possible at the time of the walk-over survey. Further ENSR was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. ENSR is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to ENSR and including the doing of any independent investigation of the information provided to ENSR save as otherwise provided in the terms of the contract between the client and ENSR.
8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and ENSR] [based on an understanding of the available operational and historical information.] and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B

Regulatory Correspondence

Our Ref : SO/2002/017205-1/1
Your Ref : 10468/L02/pdw



**ENVIRONMENT
AGENCY**

Date : 05 December 2002

ENSR international
Spring Lodge
172
Chester Rd
Helsby
WA6 OAR

Dear Sirs

**PUBLIC REGISTER AND ENVIRONMENTAL INFORMATION REQUEST
TETROSYL LTD BEVIS GREEN WORKS, MILL ROAD, WALMERSLY, BURY**

Further to our letter of 22nd October, please find the following information regarding the above site.

Please find enclosed a listing which gives details of all known licensed abstractions within the vicinity of the site. Whilst every effort is made to ensure the information provided is as accurate as possible, please note that this data is based on current licensed abstraction within the specified area. It is possible that unlicensed abstractions also exist, particularly for domestic and/or agricultural use, which are not included on the list. Further information regarding these abstractions, if any, may be obtained from the appropriate Environmental Health Department who are required to keep records for sources used for private water consumption.

Please find enclosed details of Pollution Incidents and Discharge Consents within 1000 metres of the site.

According to our records there are no general quality assessment (GQA) data to be found within a 1000 metre radius of the site.

There are no current Waste Management Licence holders within 250 metres of the site.

The search revealed the following landfill within 250 metres of the site:

Number:	Not licensed (C111)
Site:	Mill Road, Walmersley
NGR:	SD 8085 1370
Holder:	Not Licensed (Pre COPA)
Status:	Closed
Waste accepted:	The site consists of former sewage tanks filled with waste (believed to be ash).

The Agency would raise objection to any Planning Applications made that did not address the above and also recommend that a flood risk assessment is carried out in accordance with PPG25.

The site is not within a currently defined groundwater source protection zone.

Please find enclosed, groundwater quality information.

The groundwater section has no details of any boreholes or wells within the outlined site.

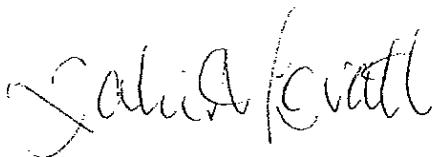
Sheet 11 (Groundwater Vulnerability Of South Pennines) of the Policy and Practice for the Protection of Groundwater defines the site as being minor aquifer overlain by soils of high leaching potential. The map also shows low permeability deposits to occur at the surface.

According to our records, there are no Integrated Pollution Control (IPC) or Radioactive Substances (RAS) sites within 250 metres of the site.

To the best of our knowledge there are no prosecutions or outstanding Notices affecting this site.

The information provided is based on that currently available to the Agency. The Agency and its officers accept no liability whatsoever for any loss or damage arising from the interpretation or use of the information.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Jaki Lovatt', written in a cursive style.

JAKI LOVATT
Customer Contact Officer

Report Title ABSTRACTION LICENCE DETAIL BY MANAGEMENT UNIT / REPORTING UNIT
Short Name AR252R

<u>PARAMETERS</u>	<u>VALUES</u>	<u>PARAMETERS</u>	<u>VALUES</u>
USER	VWALKER		
REPORT TYPE	DETAIL	SORT BY	LIC_NO
DESTINATION TYPE	Printer	DESTINATION NAME	
REQUIRED DATE FROM	28/10/2002	REQUIRED DATE TO	
MANAGEMENT UNIT	NORTH WEST CATCHMENTS	REPORTING UNIT	
LICENCE NO	ALL		
LICENCE HOLDER NAME	ALL		
CONDITIONS ON LICENCES	ALL	AGREEMENTS	ALL
SOURCE OF SUPPLY	ALL	SOS TYPE	ALL
CRITICALITY CLASS	ALL	POINT CATEGORY	ALL
PURPOSE	ALL	POINT TYPE	ALL
	ALL		
RANGE SEARCH BY ANNUAL QTY	NONE DEFINED		
RANGE SEARCH BY DAILY QTY	NONE DEFINED		
RADIAL SEARCH	NGR SD 8091 1384	DISTANCE	0.5 km
SQUARE SEARCH	NONE DEFINED		

Warning: The figures shown on this report do not take account of any authorised quantity restrictions that may exist between linked licences or within a licence (See the conditions section of the report for this information)

Date: 28/10/2002
Time: 09:01:22

NALD - North West Region

ABSTRACTION LICENCE DETAIL BY MANAGEMENT UNIT / REPORTING UNIT

Page: 3

Licence No: 2569001247

Issue No
100

Incr No
0

Status
CURR

Effective Start
09/05/1995

Effective End
Y

Returns Req?
Y

Chargeable?
Y

Purpose: Industrial, Commercial and Public Services - Other Industrial/Commercial/Public (Cont/d..)

Abs Period Start: 1/1 General Cooling (Existing Licences Only) (Low Loss)

Abs Period End: 31/12 Time Ltd Start:

Time Ltd End:

Annual Qty:

453000 m3 Legal

Daily Qty:

1512 m3 Legal

Hourly Qty:

86 m3 Legal

Inst Qty:

1/s

Lands: LAND AT BEVIS GREEN WORKS, WALMERSLEY

Measurement: Meter

LH Records: Daily

Local Name

UNNAMED TRIBUTARY OF PIGS LEE BROOK FEEDING

A RESERVOIR AT B

NGR1:SD 8095 1390 0.1km NGR2:

Means of Abs: Unspecified Pump

Primary Type
Surfacewater

Secondary Type
Offstream pond

Category
Single Point

NGR3:

NGR4:

CONDITIONS

Description

Aggregate

Text 1: 453000

Aggregate

Text 1: 1512

Aggregate

Text 1: 86

Description

Purpose to purpose; Link within a licence

Text 2: Annual

Purpose to purpose; Link within a licence

Text 2: Daily

Purpose to purpose; Link within a licence

Text 2: Hourly

AGREEMENTS

Code

Description

Effective Start

Effective End

Signed Date

File Ref

* END OF REPORT *

Pollution Incidents, Discharge Consents and GQA Results *within 1000 metres of SD 8091 1390*

Pollution Incidents March 2001 onward

Reported Date	Incident No	Incident NGR	Category Air	Category Water	Category Land	Agency/Inspector
27/06/01	11863	SD 80773 13357	4	4	3	C
Location						
Mather Road, Bury						
Pollutant						
General Biodegradable Materials and Wastes			Premises		Cause	
					Fly-Tipping	

Date Reported	Incident No	Incident NGR	Category Air	Category Water	Category Land	Waste Mngmt Impact
10/05/99	31813	SD80901340				3
Location						
OLD MILL LODGE, MATHER ROAD, WALMERSLEY						
Pollutant	Premises			Catchment		
	No premises identified			RIVER MERSEY (ETHEROW)		

Date Reported	Incident No	Incident NGR	Category Air	Category Water	Category Land	Waste Mngmt Impact
02/08/99	30903	SD80601400	4	3	4	
Location						
BEHIND PLAYGROUND, 742 WALMERSLEY ROAD, BURY						
Pollutant	Premises			Catchment		
Other Pollutant	No premises identified			RIVER IRWELL		

Date Reported	Incident No	Incident NGR	Category Air	Category Water	Category Land	Waste Mngmt Impact
07/10/99	33093	SD80601320	4	3	4	
Location						
RUNS UNDER WALMSLEY RD.						
Pollutant	Premises			Catchment		
Other Pollutant	No premises identified			RIVER IRWELL		

Date Reported	Incident No	Incident NGR	Category Air	Category Water	Category Land	Waste Mngmt Impact
17/01/00	35273	SD80501320	4	3	4	
Location						
PIGSLEE BROOK AT WALMERSLEY ROAD						
Pollutant	Premises			Catchment		
Other	No premises identified			RIVER IRWELL		

<i>Date Reported</i>	<i>Incident No</i>	<i>Incident NGR</i>	<i>Category Air</i>	<i>Category Water</i>	<i>Category Land</i>	<i>Waste Mngmt Impact</i>
28/12/00	44947	SD80701370	4	4	3	
<i>Location</i>						
WALMESLEY OLD ROAD						
<i>Pollutant</i>	<i>Premises</i>	<i>Catchment</i>				
Industrial and Commercial waste	Pubs and bars	RIVER IRWELL				

Consents to Discharge

Consent Number 016982618		Applicants Address BRIAN LEWIS LINGLEY MERE GREAT SANKEY WARRINGTON CHESHIRE WA5 3LP		Organisation Address UNITED UTILITIES WATER PLC THIRLMERE HOUSE LINGLEY MERE LINGLEY GREEN AVE GT SANKEY WARRINGTON CHESHIRE WA5 3LP	
Agreement Version 1	Relevant Legislation POSTINRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY)	Effective From 30/09/94	Revoked On		
Ortlet Number 1 Additional Details STORM SEWAGE EFFLUENT OUTLET TO WATERCOURSE WALMERSELY BROOK					
Civil Ref: SD804701384 Conditions					
Consent Number 016982875		Applicants Address BRIAN LEWIS LINGLEY MERE GREAT SANKEY WARRINGTON CHESHIRE WA5 3LP		Organisation Address UNITED UTILITIES WATER PLC THIRLMERE HOUSE LINGLEY MERE LINGLEY GREEN AVE GT SANKEY WARRINGTON CHESHIRE WA5 3LP	
Agreement Version 1	Relevant Legislation POSTINRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY)	Effective From 30/09/95	Revoked On		

Outlet Number	1	Additional Details		2150MM DIA CLAY PIPES OUTLETS TO WATERCOURSE WALMERSLEY BROOK	
Crd Ref:	SD804501383	Conditions			
Consent Number 01BRY0006		Applicants Address		Organisation Address	
BRIAN LEWIS LINGLEY MERE GREAT SANKEY WARRINGTON CHESHIRE		BRIAN LEWIS LINGLEY MERE GREAT SANKEY WARRINGTON CHESHIRE		UNITED UTILITIES WATER PLC THIRLMERE HOUSE LINGLEY MERE LINGLEY GREEN AVE GT SANKEY WARRINGTON CHESHIRE	
WA5 3LP		WA5 3LP		WA5 3LP	
Agreement Version	1	Relevant Legislation	POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY)		
			Effective From	01/01/95	
			Revoked On		
Outlet Number	1	Additional Details		C/DEEMED1 OUTLET STREAM	
Crd Ref:	SD804101384	Conditions			
Consent Number 01BRY0007		Applicants Address		Organisation Address	
BRIAN LEWIS LINGLEY MERE GREAT SANKEY WARRINGTON CHESHIRE		BRIAN LEWIS LINGLEY MERE GREAT SANKEY WARRINGTON CHESHIRE		UNITED UTILITIES WATER PLC THIRLMERE HOUSE LINGLEY MERE LINGLEY GREEN AVE GT SANKEY WARRINGTON CHESHIRE	
WA5 3LP		WA5 3LP		WA5 3LP	
Agreement Version	1	Relevant Legislation	POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY)		
			Effective From	01/01/95	
			Revoked On		
Outlet Number	1	Additional Details		C/DEEMED1 OUTLET STREAM	
Crd Ref:	SD806201323	Conditions			

xtab_summary

SMPT_SH	SAMP_SM	SAMP_SA	SAMP_SAM	SAMP_PU	SAMP_MA	0050 Lead	0061 pH P	0077 Cond
GIN HALL	88006528	#####	1200	PI	2EZZ	< 50	6.91	547
GIN HALL	88006528	#####	1600	ZZ	2EZZ	< 50	6.82	472
GIN HALL	88006528	#####	1315	UI	2EZZ		7.06	491
GIN HALL	88006528	#####	1230	UI	2EZZ		6.89	514
GIN HALL	88006528	#####	1230	UI	2EZZ		7.2	509
GIN HALL	88006528	#####	1300	UI	2EZZ		7.02	473
GIN HALL	88006528	#####	1415	UI	2EZZ	< 50	6.79	662
GIN HALL	88006528	#####	1210	UI	2EZZ	< 50	7.08	526
GIN HALL	88006704	#####	1200	PI	2EZZ	< 50	6.91	547
GIN HALL	88006704	#####	1350	PI	2EZZ	< 50	7.06	491
GIN HALL	88006704	#####	1230	UI	2EZZ		6.89	514
GIN HALL	88006704	#####	1230	UI	2EZZ		7.2	509
GIN HALL	88006704	#####	1300	UI	2EZZ		7.02	473
GIN HALL	88006704	#####	1415	UI	2EZZ	< 50	6.79	662
GIN HALL	88006704	#####	1145	UI	2EZZ		9.6	761
GIN HALL	88006704	#####	1220	UI	2EZZ	< 50	6.9	501
GIN HALL	88006704	#####	1200	UI	2EZZ	< 50	7.05	581
GIN HALL	88006704	#####	1200	UI	2EZZ	.885	6.8	460
GIN HALL	88007530	#####	1130	ZZ	2EZZ		7.22	321
GIN HALL	88007531	#####	1200	ZZ	2EZZ		7.69	310
GIN HALL	88007532	#####	1230	ZZ	2EZZ		7.2	364
GIN HALL	88009093	#####	1010	UI	2EZZ		7.2	
GIN HALL	88009109	#####	1130	PI	2EZZ		7.22	321
GIN HALL	88009110	#####	1200	PI	2EZZ		7.69	310
GIN HALL	88009111	#####	1230	PI	2EZZ		7.2	364
GIN HALL	88009112	#####	1410	PI	2EZZ	< 50	6.96	426
GIN HALL	88009113	#####	1410	PI	2EZZ	< 50	7.02	439

0207 Sodi	0211 Potas	0237 Magn	0241 Calci	0421 Iron	1042 Ethan	1065 Hexa	1068 Isobu	1075 Butan
30.5	4.1	16.5	47.5	7.425	35.7	53.1	26.4	36
				14.5				
				83				
30.5	4.1	16.5	47.5	7.425	35.7	53.1	26.4	36
				14.5				
34.5	3.8	14.6	36.5	21				
36.5	3.85	15.4	34	10.6				
35.4	4.33	14.8	44.1					
15.5	2.7	8.35	33	1.3				
22	2.4	7.8	28.5	.905				
15	2.95	11	39.5	.34				
				1.6				
15.5	2.7	8.35	33	1.3				
22	2.4	7.8	28.5	.905				
15	2.95	11	39.5	.34				
26	3.57	14	35.5	3.95				
24	3.41	14.4	40	3.89				

6388 Hdss	6389 Alkali	6392 Orthp	6452 Copp	6455 Zinc	6462 Nicke	6528 Weth	6529 Weth	6530 Weth
187	204	< .05	< 15	30.5	< 30			
			15	80	22			
	227	< .05						
		< .05						
		.1						
	131	< .05						
	213	< .05	< 15	16	< 30	99	99	99
	206	.06	11	150	< 30	99	99	99
187	204	< .05	< 15	30.5	< 30			
	227	< .05	< 15	24	< 30			
		< .05						
		.1						
	131	< .05						
	213	< .05	< 15	16	< 30	99	99	99
	220	.18				99	99	99
151	207	< .05	< 15	69	21.5	99	99	99
148	209	< .05	< 15	8.2	< 30	99	99	99
171	206	< .05	2.14	8.8	< .5	99	99	99
117	95							
103	105							
144	135							
157	219							
117	95							
103	105							
144	135							
146	161	< .05	< 15	50.5	< 30			
159	175	< .05	20	22	< 30			

SMPT_USE	SMPT_SH	SMPT_LO	SMPT_GRID_REF
88006704	GIN HALL	GIN HALL	SD8056014080
88006528	GIN HALL	GIN HALL	SD8056014080
88009110	GIN HALL	GIN HALL	SD8055014100
88007531	GIN HALL	GIN HALL	SD8055014100
88009112	GIN HALL	GIN HALL	SD8054014200
88009113	GIN HALL	GIN HALL	SD8053014200
88009111	GIN HALL	GIN HALL	SD8045014150
88007532	GIN HALL	GIN HALL	SD8045014150
88009109	GIN HALL	GIN HALL	SD8052014250
88007530	GIN HALL	GIN HALL	SD8052014250
88009093	GIN HALL	GIN HALL	SD8052014430

NOTICE - GENERAL

1. Nothing in this notice will in any way restrict your statutory or any other rights of access to the Data.
2. All intellectual property rights in the data and information supplied to you ("Data") whether owned by the Agency ("Agency Data") or third parties ("Third Party Data") will continue to be owned by the respective parties.
3. The Data have not been prepared to meet your or anyone else's individual requirements and it is therefore your responsibility to ensure that the Data meet your needs.
4. The Agency cannot ensure that the Data in its possession will always be accurate, complete, up to date or valid but the Agency will use reasonable care to ensure that you are provided with an accurate copy of the Data that is in its possession. The Agency gives no warranty that the copy of the Data that it provides is accurate. This does not restrict your statutory rights.
5. Any charge you may pay us reflects only the reasonable cost of supplying the Data to you.
6. If you have asked for the Data to be supplied in an electronic format we cannot guarantee that the medium is free of any defects and you should undertake the appropriate virus checks.
7. Third party data use, including copying, must be limited to statutory rights.

USE OF AGENCY DATA

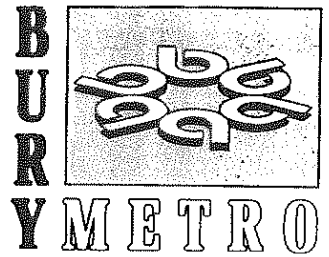
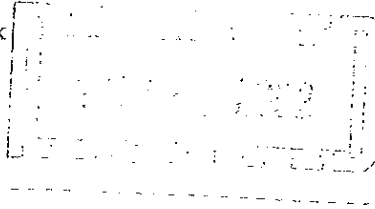
8. **INTERNAL BUSINESS OR PERSONAL USE.** You may use Agency Data for your own private use or for use within your business without restriction.
9. **GIVING COPIES TO OTHERS.** You may do this without restriction in respect of Agency Data provided that you make no charge and attach a copy of this notice. Recipients should also comply with the notice. Whenever possible and appropriate any authorised copying of Agency Data shall acknowledge the Agency's ownership of Agency Data. One way of doing this is by adding the words "Copyright © Environment Agency" to the information or copy.
10. **OTHER USE.** If you wish to use Agency Data in any way other than as set out above (including in particular for commercial gain, for example by way of rental, licence, sale or providing services for consideration) you should contact us with details of what you are proposing to do, **UNLESS** we have already indicated to you that your proposed use is agreed OR you are satisfied that such use would not infringe our intellectual property rights.
11. **USE BY SOLICITORS, SURVEYORS ETC.** If you are a solicitor, a chartered surveyor or other professional whose professional body has an arrangement with the Agency you may use Agency Data in accordance with these arrangements ("Professional Body Arrangements") in which case paragraphs 1 to 8 above and the Professional Body Arrangements shall apply. Paragraphs 1 to 10 above shall apply in respect of all uses not covered by Professional Body Arrangements.

Philip D Allen CPFA

Director of Environment & Development Services

Our Ref ES/ENV/SC/CJW
Your Ref 10468/L01/pdw
Date 14 October 2002
Please ask for Ms S Casserley
Direct Line 0161-253 5581
Direct Fax 0161-253 5563
E-Mail S.Casserley@bury.gov.uk

Mr Paul Walton
RSK ENSR
172 Chester Road
Helsby
Cheshire
WA6 0AR



**ENVIRONMENTAL
SERVICES DIVISION**

*Textile Hall
Manchester Road
Bury BL9 ODG
Tel: 0161-253-5566*

**Alan Freer
Borough Environmental
Services Officer**

Dear Mr Walton

**TETROSYL LIMITED, BEVIS GREEN WORKS, MILL ROAD, BURY
ENVIRONMENTAL SEARCH**

Further to your facsimile dated 09 October 2002 and our telephone conversation on 10 October 2002, please find below our response based on the information held within this Department.

Our records indicate that there is one former landfill site within 250m of the property in question. It is located at approximately 50m south-west of the site in question. Our records indicate that this former landfill site comprises infilled former sewage tanks. As the site was operated pre-licensing, very little is known about the waste types at the site. A spike survey was undertaken by this Department in 1992 and, on this occasion, no methane was detected; however, some elevated concentrations of carbon dioxide (up to 10% by volume) were recorded.

We are unaware of any pollution incidents at the site.

The attached annotated plan shows the location and information available on past potentially contaminative historical land uses in close proximity to the land in question. The source of this information is from Landmark who have reviewed historical plans and highlighted those land uses which may have caused potential contamination.

Our records indicate that there are no private water supplies within 250m of the site in question.

Our records indicate that, aside from on the site in question, there are no hazardous installations or Part A, Part B, IPC or IPPC authorisations within 250 metres of the site.

Cont/d

Bury Prestwich Radcliffe Ramsbottom Tottington Whitefield
Metropolitan Borough of Bury

*Community
Legal Service*



HELA

Award for
Innovation
in
Workplace
Health & Safety
2001
Health
& Safety
Commission



Trading Standards
Certificate Number
Q51206



Certificate Number 1649/98
Environmental Health
Food Safety Service



Web:
www.bury.gov.uk

Mr Paul Walton
14 October 2002

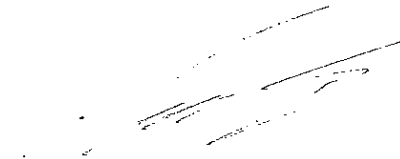
Continuation

As explained on 10 October 2002, we are able to do a search of our database for public nuisance complaints related specifically to the site in question. A review of our records indicates that from June 1993 to date there have been 10 noise and 15 odour/fume complaints.

Regarding your enquiry on petroleum licences, please contact the Brigade Petroleum Officer, Mr Phil Ingham, on 0161 608 4182.

*** We have enclosed a receipt for your cheque of £131.60 (including VAT). Should you have any queries, please do not hesitate to contact me.

Yours sincerely



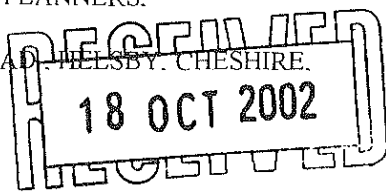
S CASSERLEY (MS)
SCIENTIFIC OFFICER

Please note:

- The above details are based upon records currently held by the Environmental Services Division and are believed to be accurate. However, this Division can accept no responsibility for their accuracy or completeness.
- The Environmental Services Division has used all reasonable endeavours to determine the risk from contaminated land based on the information available to it. However, the comments made above should not be taken to imply that the land is safe or otherwise suitable for this or any other development
- The responsibility for the safe and secure occupancy of the site rests with the developer/consultant



RSK ENVIROMENT LIMITED,
ENGINEERS AND PLANNERS,
SPRING LODGE,
172, CHESTER ROAD, WELLSBY, CHESHIRE,
WA6 0AR



This matter is being dealt with by Louise Tipper

Our Ref: 431866-02

Your Ref: 10468

Electronic Ref:

Date: 17 October 2002

Dear Sir,

Coal Mining Report

**TETROSYL LTD, BEVIS GREEN WORKS, MILL ROAD, WALMERSLEY, BURY,
LANCASHIRE, BL9 6RE**

I refer to the enquiry dated 10th October 2002, received 14th October 2002, in connection with the above.

This report is based on and limited to the records in the possession of The Coal Authority at the time the search is answered.

- Ordnance Survey (O.S.) is undertaking a Positional Accuracy Improvement Programme of its mapping data. The Coal Authority (CA) has no control over the timing of issue of Positionally Improved mapping data by O.S. or over users of that data. In some instances the relative position between surface features and coal mining features may alter as a consequence of this programme. The CA will ensure that the integrity of its database is maintained by replotting some mining information to sustain the relationship between that mining information and the improved O.S. surface positions, some of which are now being released. However, mining reports are currently being produced against pre improved O.S. mapping whilst the Authority updates its database in line with the O.S. changes.

Past Underground Mining

The property is within the likely zone of influence on the surface from workings in 1 seam of coal at shallow depth, the last date of working being 1877.

Present Underground Mining

The property is not within the zone of likely physical influence on the surface from any present underground coal workings.

Future Underground Mining

The property is not within a geographical area for which a licence to extract coal by underground methods is awaiting determination by the Coal Authority.

The property is not within a geographical area for which a licence to extract coal by underground methods has been granted.

Working Facilities Orders

The property is not within a geographical area that is the subject of an Order made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to Owners of Former Copyhold Land

The property is not within an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Additional Remarks

In view of the mining circumstances a prudent developer would seek appropriate technical advice before works are undertaken on site. All proposals should have regard to good engineering practice in mining areas as identified in authoritative publications on mining stability problems. In any event, no activities should be undertaken that intersect, disturb, or interfere with any coal or mines of coal without permission of the Coal Authority.

These replies are prepared in accordance with the Law Society's Guidance Notes 1998.

We acknowledge the receipt of your remittance in payment of our fee.

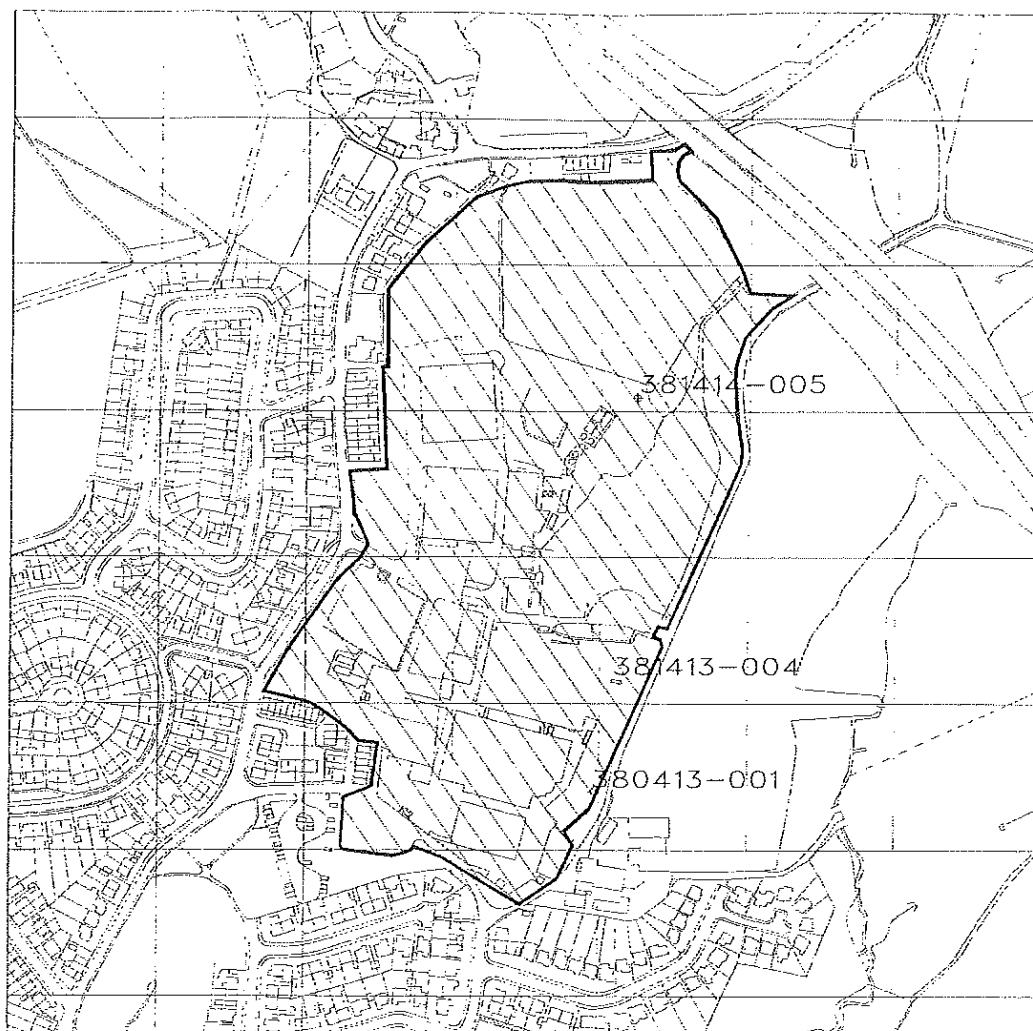
Yours faithfully

A handwritten signature in black ink, appearing to read 'A Schofield', written in a cursive style.

Albert Schofield

Director of Mining Records and Services

— —
—



Crown Copyright. Quoted scale is approximate.

SCALE: 1:5000

This map is reproduced from the Ordnance Survey material by The Coal Authority [or division thereof] with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number: AL51060A001.

This is a plan of the boundaries of the property in respect of which this report has been prepared. It is the responsibility of the user to ensure that the boundaries shown correspond with those of the property.

APPROXIMATE POSITION OF ENQUIRY BOUNDARY SHOWN



APPROXIMATE POSITION OF DISUSED MINE SHAFTS SHOWN



APPROXIMATE POSITION OF DISUSED MINE ADITS SHOWN



This plan shows the approximate location of the disused mine entry/entries referred to in the attached mining report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan. Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A DTI leaflet setting out the rights and the obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848.

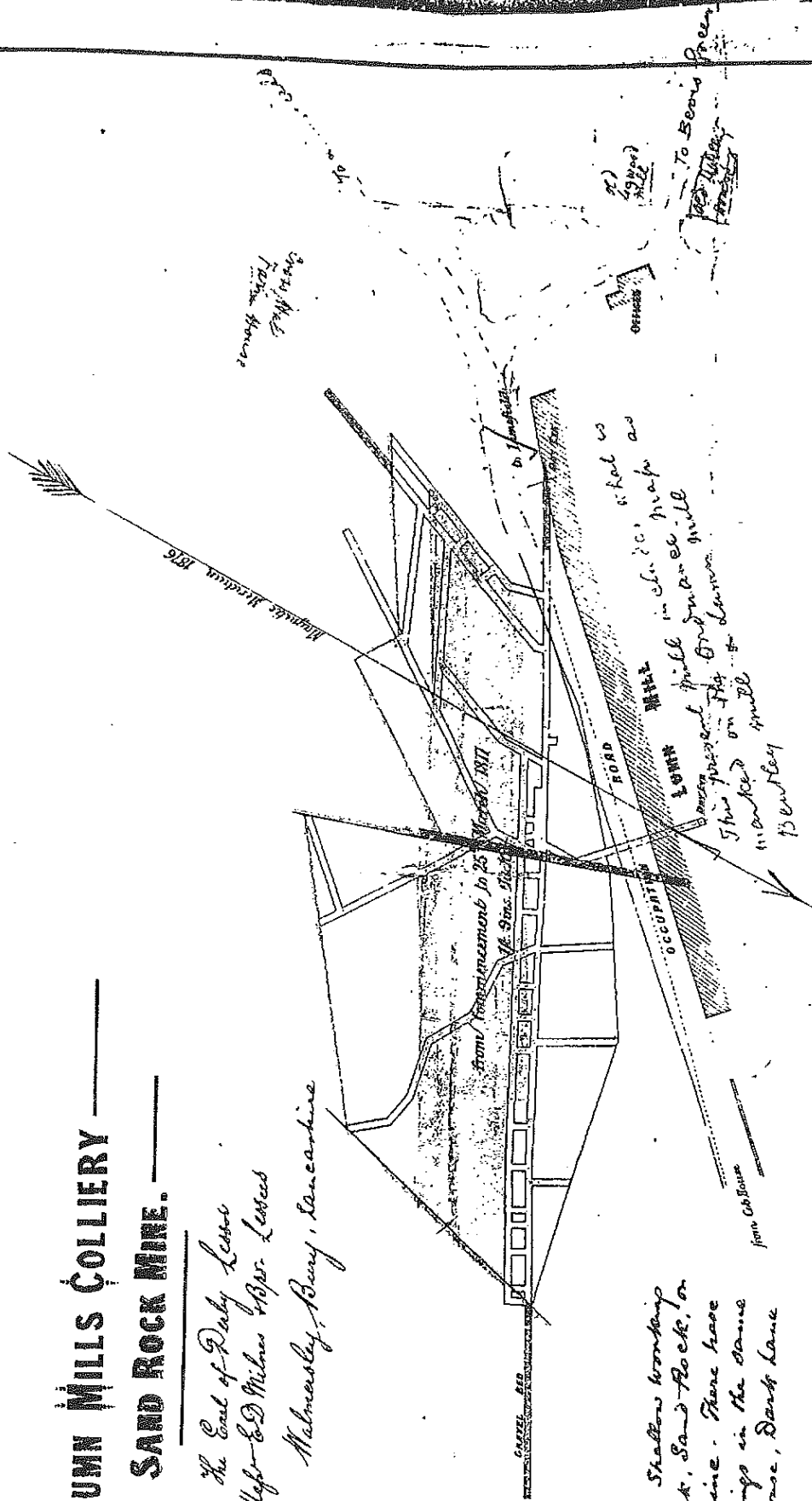
If you wish to discuss the relevance of any of the information contained in the attached report you should seek the advice of a qualified mining engineer or surveyor. If you or your adviser wish to examine the source plans from which the information has been taken these are available at our Mansfield office, free of charge, by prior appointment, telephone 01623 638233. Should you or your adviser wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number at all times is 01623 646333.

SAND ROCK AVE.

24 The Earl of Derby Lessee
Messrs. E. D. Milnes & Co. Lessors

Walmersley, Barry, Lancashire



men. This is a shallow workings in the Rough Rock, Sand Rock, or $3\frac{1}{4}$ Mountain mine. There have been other workings in the same stream at Cold House, Dark Lane &c. adjoining:

Joseph Dickerson.
Inspector of Mines
31 October 1899

Scale, 20 yards per Inch -

Brooklyn 1894

26 OCT 1971

APPENDIX C

Trial Pit, Probehole and Borehole Records

TRIAL PIT RECORD

Date of Investigation: 29 October 2002

Type of Excavator: JCB 3CX

TRIAL PIT 1 (field at top of site)

Ground level-0.20m	Grassed over TOPSOIL
0.20m-1.70m	Firm to stiff orange mottled grey slightly sandy silty CLAY with a little fine to medium gravel and coal
	END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable

TRIAL PIT 2 (field at top of site)

Ground level-0.20m	Grassed over dark brown TOPSOIL with rootlets
0.20m-1.00m	Firm to stiff orange brown slightly sandy silty CLAY with a little sandstone cobbles and coarse gravel
1.00m	Cobbles of SANDSTONE
	EXCAVATION TOO DIFFICULT TO CONTINUE
	END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable
Trial pit abandoned on sandstone cobble bedrock

TRIAL PIT 3 (top of site)

Ground level-0.05m	MADE GROUND (loose road gravel)
0.05m-0.35m	MADE GROUND (moderately compact sandstone gravel)
0.35m-0.50m	MADE GROUND (stiff dark brown sandy clay with occasional pottery fragments)
0.50m-1.50m	Stiff orange mottled grey sandy CLAY with some coarse sandstone gravel, cobbles and boulders becoming many with depth
	END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable

TRIAL PIT 4 (top of site)

Ground level-0.10m	MADE GROUND (tarmac surface)
0.10m-0.40m	MADE GROUND (fine to coarse sandstone gravel)
0.40m-0.60m	MADE GROUND (firm dark brown sandy clay with a little rootlets and twigs)
0.60m-1.90m	Stiff orange mottled grey sandy CLAY with a little sandstone gravel, cobbles and boulders • land drain at 0.90m (no water)
	END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable

TRIAL PIT 5 (greenhouses at top of site)

Ground level-0.05m	MADE GROUND (loose gravel surface)
0.05m-0.20m	MADE GROUND (loose to moderately compact coarse gravel and sand fill)
0.20m-0.70m	MADE GROUND (dark brown sandy clay with rootlets • land drain at 0.70m containing water)
0.70m-1.90m	Stiff orange mottled grey sandy CLAY with a little coarse sandstone gravel and cobbles
	END OF TRIAL PIT

Remarks

Groundwater was encountered within the land drain
The sides of the trial pit remained stable

TRIAL PIT 6 (reservoir)

Ground level-1.40m	MADE GROUND (loose to moderately compact sand and fine to coarse gravel matrix with some reinforced concrete boulders, bricks, sandstone boulders and plastic sheeting • Black water entry at 0.90m • Hydrocarbon odour • Hydrocarbon sheen on wet gravel)
	TRIAL PIT ABANDONED

Remarks

Rapid water entry at 0.90m
The sides of the trial pit collapsed below 0.50m

TRIAL PIT 7 (the croft)

Ground level-0.15m	MADE GROUND (loose to moderately compact grey medium to coarse gravel))
0.15m-0.50m	MADE GROUND (loose to moderately compact pale orange sand, gravel and broken brick)
0.50m-3.80m	MADE GROUND (loose to moderately compact dark brown ash and clinker with a little fine to coarse gravel and pottery fragments)
	END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable

TRIAL PIT 8 (the croft)

Ground level-0.50m	MADE GROUND (gravel)
0.50m-2.10m	MADE GROUND (loose to moderately compact dark brown ash and clinker with a little fine to coarse gravel and pottery fragments)
2.10m-3.40m	Firm orange mottled grey sandy CLAY with a little fine to medium gravel • possibly reworked
	END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable

TRIAL PIT 9 (just north of solvent recovery)

Ground level-2.90m MADE GROUND (grassed over firm brown mottled orange and black silty clay with a little brick fragments, wooden logs, roots and fibrous vegetation)

END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable
Standpipe installed to 3.00m (top 1.00m plain)

TRIAL PIT 10 (edge of field at top end of site)

Ground level-0.50m MADE GROUND (grassed over grey gravel and sand with rootlets)

0.50m-1.90m Stiff orange mottled grey very friable sandy silty CLAY with a little sandstone gravel and boulders at depth

END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable

TRIAL PIT 11 (edge of field at top end of site)

Ground level-0.50m	Loose dark brown sandy TOPSOIL
0.50m-2.00m	Stiff orange mottled grey very friable sandy silty CLAY with a little coarse sandstone gravel

END OF TRIAL PIT

Remarks

Groundwater was not encountered
The sides of the trial pit remained stable

PROBEHOLE RECORDS

Date of Investigation: 23-28 October 2002

Equipment Used: Portable Percussive Window Sampler

PH1 ('Resin Room')

Ground Level – 0.15m	MADE GROUND (concrete)
0.15m – 0.25m	MADE GROUND (moderately compact black ash and clinker with a little pale brown sand)
0.25m – 0.30m	Compact pale brown friable weathered coarse SANDSTONE
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.15m – 0.25m / 2 D2 0.30 / -
Remarks	Groundwater was not encountered.

PH2 ('Resin Room')

Ground Level – 0.15m	MADE GROUND (concrete)
0.15m – 0.25m	MADE GROUND (moderately compact black ash and clinker)
0.25m – 0.30m	Firm dark brown very clayey SILT
0.30m – 0.35m	Compact pale brown friable laminated weathered coarse SANDSTONE
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.50m / 3
Remarks	Groundwater was not encountered.

PH3 (Outside 'Resin Room')

Ground Level – 0.18m	MADE GROUND (reinforced concrete)
0.18m – 0.85m	MADE GROUND (loose to moderately compact ash and brick gravel with a little sandstone gravel)
0.85m – 1.00m	Compact pale orange slightly weathered coarse SANDSTONE
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.15m – 0.20m / 2
Remarks	Groundwater was not encountered.

PH4 (Outside 'Resin Room')

Ground Level – 0.16m	MADE GROUND (reinforced concrete)
0.16m – 0.85m	Moderately compact silty clayey weathered sandstone becoming less weathered with depth (possibly reworked)
0.85m – 1.00m	Compact pale orange slightly weathered coarse SANDSTONE
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	No samples taken
Remarks	Groundwater was not encountered.

PH5 (Next to Sub-station)

Ground Level - 0.19m	MADE GROUND (reinforced concrete)
0.19m – 0.50m	MADE GROUND (moderately compact brick and sandstone gravel with a little sand and clay)
0.50m – 1.50m	Moderately compact pale brown highly weathered friable SANDSTONE
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.19m – 0.30m / 1 D2 1.00m – 1.50m / 1
Remarks	Groundwater was not encountered.

PH6 (inside central building)

Ground Level – 0.10m	MADE GROUND (concrete)
0.10m – 1.60m	MADE GROUND (loose to moderately compact sub-angular coarse gravel and weathered sandstone gravel)
1.60m – 2.00m	MADE GROUND (firm to stiff dark brown mottled light brown and black slightly sandy silty clay with occasional rounded coarse gravel and occasional fine coal fragments-possibly natural)
2.00m – 2.70m	Compact pale brown highly weathered coarse SANDSTONE • Partings of more weathered material / silty clay within the sandstone (possibly reworked material)
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 1.60m – 1.70m / 1 D2 2.70m / 2
Remarks	Groundwater was not encountered. 35mm standpipe installed to 2.70m; 2.00m slotted, 0.70m plain.

PH7 (Just Inside Car Maintenance Shed)

Ground Level – 0.15m	MADE GROUND (reinforced concrete)
0.15m – 0.25m	MADE GROUND (loose to moderately compact pale brown sandstone gravel and sand)
0.25m – 1.00m	MADE GROUND (loose black ash with a little fine to coarse sandstone gravel and fine to medium brick fragments)
1.00m – 2.90m	MADE GROUND (loose black ash with partings of dark orange sand)
2.90m – 3.00m	Pale brown coarse SANDSTONE
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	0.50m / - 1.00m – 1.10m / 1 1.00m – 2.00m / 2 2.00m – 3.00m / 2
Remarks	Groundwater was not encountered. 35mm standpipe installed to 3.00m: 2.00m slotted, 1.00m plain.

PH8 (Inside Car Maintenance Shed)

Ground Level – 0.19m	MADE GROUND (reinforced concrete)
0.19m – 0.40m	MADE GROUND (loose to moderately compact medium to coarse gravel of brick and sandstone)
0.40m – 0.80m	MADE GROUND (moderately compact medium to coarse gravel of coarse sandstone with a little sand)
0.80m – 0.90m	MADE GROUND (loose to moderately compact black ash with a little coarse sandstone gravel)
0.90m – 1.00m	Pale brown / grey coarse SANDSTONE
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.70m - -0.80m / 1
Remarks	Groundwater was not encountered.

PH9 (beside tank outside car maintenance shed)

Ground Level – 0.14m	MADE GROUND (concrete)
0.14m – 0.20m	MADE GROUND (red brick blocks)
0.20m – 0.40m	MADE GROUND (sand and gravel)
0.40m – 0.50m	MADE GROUND (loose to moderately compact black ash)
0.50m – 0.60m	MADE GROUND (moderately compact sandstone cobbles and gravel)
0.60m – 1.50m	MADE GROUND (loose to moderately compact dark brown ash with some coarse sand and fine gravel)
1.50m – 2.50m	MADE GROUND (soft and soft to firm pale orange-brown sandy clay with a little medium to coarse gravel and fine to medium coal fragments • ash between 2.30m – 2.40m)
2.50m – 3.90m	MADE GROUND (firm dark brown slightly sandy silty clay with a little subrounded medium to coarse gravel and a little fine coal)
3.90m – 4.20m	MADE GROUND (moderately compact black ash)
4.20m – 4.50m	MADE GROUND (soft brown mottled orange clay with a little fine to medium gravel)
4.50m – 5.00m	MADE GROUND (layers of black ash alternating with layers of brown and grey clay with a little medium to coarse gravel)

END OF PROBEHOLE

Sample depths / PID reading (ppm)	D1 0.40m – 0.50m / 1
	D2 0.80m – 0.90m / 1
	D3 1.40m – 1.50m / 1
	D4 2.50m – 2.60m / 1
	D5 2.90m – 3.00m / 1

Remarks Groundwater was not encountered.
Standpipe installed to 5.00m; ground level to 1.00m plain, 1.00m to 5.00m slotted.

PH10 (next to diesel tank at bottom of site)

Ground Level – 0.05m	MADE GROUND (rough Tarmac surface)
0.05m – 0.25m	MADE GROUND (sandstone gravel and sand • slight hydrocarbon odour)
0.25m – 3.60m	MADE GROUND (loose to moderately compact dark brown slightly clayey gravely ash • layer of firm brown mottled orange sandy clay at 1.90m – 2.00m and 2.70m • slight hydrocarbon odour to 0.50m)
3.60m – 4.00m	Moderately compact highly weathered orange SANDSTONE with partings of silty clay

END OF PROBEHOLE

Sample depths / PID reading (ppm)	D1 0.30m – 0.40m / 1 D2 0.60m – 0.70m / 41 D3 0.90m – 1.00m / 4 D4 1.70m – 1.80m / 3 D5 2.80m – 2.90m / 2 D6 3.60m – 3.70m / 2
--	---

Remarks Groundwater was not encountered.
Standpipe was installed to 4.00m; ground level to 1.00m plain, 1.00m to 4.00m slotted.

PH11 (inside lower building)

Ground Level – 0.18m	MADE GROUND (concrete slab)
0.18m – 0.50m	MADE GROUND (loose to moderately compact black ash with a little sandstone and brick gravel)
0.50m – 0.75m	MADE GROUND (moderately compact fine to coarse sandstone gravel and sand)
0.75m – 0.90m	MADE GROUND (loose to moderately compact black ash)
0.90m – 1.00m	MADE GROUND (moderately compact fine to coarse angular sandstone gravel and cobbles)
1.00m – 1.50m	Moderately compact dark brown mottled orange silty SAND with a little angular sandstone gravel)
1.50m	OBSTRUCTION
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.20m – 0.30m / 2 D2 0.80m – 0.90m / 6
Remarks	Groundwater was not encountered.

PH12 (antifreeze room at bottom of site)

Ground Level – 0.18m	MADE GROUND (concrete)
0.18m – 4.00m	Stiff dark brown sandy silty CLAY with a little sub angular fine to medium gravel and occasional fine coal fragments • cobbles at 0.60m – 0.70m and 1.60m – 1.70m • wet and very soft between 2.00m and 2.50m • possible made ground
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.50m / 834 D2 1.50m / 78 D3 2.50m / 20
Remarks	Slight groundwater entries were noted between 2.00m and 2.50m.

PH13 (bowl pit at bottom of site)

Ground Level – 0.15m	MADE GROUND (concrete)
0.15m – 0.30m	MADE GROUND (ash with a little gravel)
0.30m	CONCRETE OBSTRUCTION
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.20m / 44
Remarks	Groundwater was not encountered.

PH14 (near paint spraying room)

Ground Level – 0.15m	MADE GROUND (concrete)
0.15m – 0.50m	MADE GROUND (ash with bricks and concrete blocks) fragment of suspected asbestos)
0.50m	CONCRETE OBSTRUCTION
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.30m / 29
Remarks	Groundwater was not encountered.

PH15 (near above ground fuel tank)

Ground Level – 0.08m	MADE GROUND (rough gravel surface)
0.08m – 0.20m	MADE GROUND (ash with some gravel) hydrocarbon odour)
0.20m – 0.30m	Coarse gravel and cobbles of grey and yellow SANDSTONE hydrocarbon odour
0.30m	OBSTRUCTION
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.15m / 19 D2 0.20m / 47 D3 0.25m / 50
Remarks	Groundwater was not encountered.

PH16 (eastern side of main building)

Ground Level – 0.15m	MADE GROUND (concrete)
0.15m – 0.26m	MADE GROUND (angular sandstone fragments and cobbles)
0.26m – 0.45m	MADE GROUND (loose to moderately compact black ash, sand and sandstone gravel with a little wood fragments • fragment of suspected asbestos)
0.45m	SANDSTONE OBSTRUCTION
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.40m / 10 D2 0.50m / -
Remarks	Groundwater was not encountered.

PH17 (next to old tank near reservoir)

Ground Level – 0.20m	MADE GROUND (grassed over black topsoil)
0.20m – 0.80m	MADE GOUND (sandstone gravel and cobbles with a little sandy clay and sand)
0.80m – 1.40m	MADE GROUND (loose to moderately compact black ashy matrix with a little sand and fine to coarse gravel)
1.40m – 2.60m	MADE GROUND (stiff dark brown silty CLAY with a little fine to medium rounded gravel - parting of ashy matrix between 2.20m and 2.40m - hydrocarbon odour below 1.60m)
2.60m – 2.70m	(MADE GROUND?) Firm to stiff pale orange mottled grey sandy CLAY with some sandstone and siltstone coarse gravel hydrocarbon odour
2.70m – 4.00m	(MADE GROUND?) Stiff grey mottled bright orange sandy CLAY with a little fine coal fragments becoming brown mottled grey with a little angular gravel hydrocarbon odour
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.80m – 1.00m / 50 D2 1.50m / 307 D3 1.70m – 1.80m / 24 D4 2.40m – 2.60m / 970 D5 2.60m – 2.70m / 960 D6 2.70m – 3.00m / 910 D7 3.40m – 3.50m / 407 D8 3.90m – 4.00m / 425
Remarks	Groundwater was not encountered.

PH18 (next to bitumen tank)

Ground Level – 0.30m	MADE GROUND (loose to moderately compact orange brown fine to medium sand)
0.30m – 0.50m	MADE GROUND (loose to moderately compact orange brown fine to medium sand with layers of solid black bitumen)
0.50m – 1.50m	MADE GROUND (moderately compact brown / orange sandy fine to medium gravely matrix intermixed with very sandy clay with some sandstone gravel • green discolouration of sand in places)
1.50m – 1.90m	Soft to firm very sandy fine to medium gravely CLAY with some coarse sandstone gravel
1.90m	Weathered SANDSTONE obstruction
	PROBEHOLE ABANDONED
Sample depths / PID reading (ppm)	D1 0.50m / 73 D2 1.60m – 1.80m / 5
Remarks	Groundwater was not encountered.

PH19 (next to tank between warehouses)

Ground Level – 0.23m MADE GROUND (reinforced concrete slab)

0.23m – 0.43m Very weathered friable SANDSTONE

END OF PROBEHOLE

**Sample depths / PID
reading (ppm)** D1 0.30m – 0.40m / 6

Remarks Slight groundwater entries within the weathered sandstone,
standing at 0.38m.

PH20 (far end of warehouses)

Ground Level – 0.10m MADE GROUND (Tarmac)

0.10m – 0.40m MADE GROUND (moderately compact grey sandstone gravel and
sand – possibly crushed gravel from drilling)

0.40m – 0.50m Weathered orange SANDSTONE

END OF PROBEHOLE

**Sample depths / PID
reading (ppm)** D1 0.10m – 0.40m / 10
D2 0.40m – 0.50m / 152

Remarks Groundwater was not encountered.

PH21 (inside main building)

Ground Level – 0.24m	MADE GROUND (two layers of concrete)
0.24m – 0.50m	MADE GROUND (loose to moderately compact pale brown fine to coarse sandstone gravel with a little sand)
0.50m – 0.70m	MADE GROUND (loose to moderately compact orange brown sand and angular medium sandstone gravel)
0.70m – 1.00m	MADE GROUND (loose to moderately compact grey sandstone fine to coarse gravel and cobbles)
1.00m – 1.10m	Stiff dark brown slightly sandy very silty CLAY with a little fine to medium gravel
1.10m – 1.30m	Moderately compact orange very weathered SANDSTONE intermixed with firm orange very sandy CLAY
1.30m	SANDSTONE obstruction
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.50m – 0.60m / 4 D2 1.00m – 1.10m / 20
Remarks	Groundwater was not encountered.

PH22 (inside main building)

Ground Level – 0.30m	MADE GROUND (three layers of concrete)
0.30m – 1.50m	MADE GROUND (firm dark brown very sandy clay with some sub-angular fine to coarse sandstone gravel)
1.50m – 1.80m	MADE GROUND (loose to moderately compact dark brown slightly clayey sand with a little ash)
1.80m – 1.90m	Slightly weathered SANDSTONE
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.50m – 0.60m / 3 D2 1.70m / 3
Remarks	Groundwater was not encountered.

PH23 (inside warehouse)

Ground Level – 0.18m	MADE GROUND (concrete slab)
0.18m – 0.50m	MADE GROUND (moderately compact fine to coarse sandstone gravel and sand)
0.50m – 1.20m	MADE GROUND (very stiff brown red orange and grey sandy silty clay)
1.20m – 1.30m	Very weathered friable SANDSTONE
1.30m	SANDSTONE obstruction
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 1.20m / 3 D2 1.30m / 3
Remarks	Groundwater was not encountered.

PH24 (car park)

Ground Level – 0.10m	MADE GROUND (Tarmac)
0.10m – 0.20m	MADE GROUND (Loose to moderately compact brick and sandstone gravel)
0.20m – 0.60m	MADE GROUND (moderately compact fine to coarse sandstone gravel and sand)
0.60m – 1.90m	MADE GROUND (stiff dark brown mottled orange and black slightly silty clay with a little subrounded fine to coarse gravel and coal fragments • wet between 1.00m and 1.70m
1.90m – 3.00m	MADE GROUND (moderately compact sandstone cobbles and fine to coarse gravel with a little sand • material compacted in sampling tube • wet)
	END OF PROBEHOLE

Sample depths / PID reading (ppm)

D1 1.00m / 3
D2 1.80m / 3

Remarks

Slight groundwater entries were encountered between 1.00m and 3.00m.
Standpipe installed to 3.00m; ground level to 1.00m plain and 1.00m to 3.00m slotted.

PH25 (grassed area on west of site)

Ground Level – 0.25m	MADE GROUND (dark brown topsoil with rootlets)
0.25m – 1.00m	MADE GROUND (firm to stiff dark brown mottled red grey and orange slightly sandy silty clay with some sandstone gravel and cobbles)
1.00m – 1.60m	Firm dark brown / grey sandy silty clay with a little subrounded fine to medium gravel
1.60m – 4.00m	Stiff becoming very stiff dark brown silty clay with a little subrounded sandstone gravel • wet between 2.00m and 3.00m
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.80m / 2 D2 1.50m – 1.60m / 2
Remarks	Slight groundwater entries were encountered between 2.00m and 3.00m, water standing at 1.80m. Standpipe installed to 4.00m; ground level to 1.00m plain, 1.00m to 4.00m slotted.

PH26 (inside central building)

Ground Level – 0.24m	MADE GROUND (concrete slab)
0.24m – 0.60m	MADE GROUND (moderately compact brown sand with some coarse sandstone gravel)
0.60m – 1.10m	Moderately compact weathered sandstone gravel and sand
1.10m	SANDSTONE obstruction
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.50m / 2
Remarks	Groundwater was not encountered.

PH27 (Top end of site)

Ground Level – 0.02m	MADE GROUND (road gravel)
0.02m – 0.45m	MADE GROUND (moderately compact pale brown sandstone gravel and sand)
0.45m – 0.90m	Stiff orange mottled brown friable sandy silty CLAY with a little medium to coarse sandstone gravel and fine coal fragments
0.90m – 1.00m	Compact orange weathered SANDSTONE gravel with some sand
1.00m	SANDSTONE obstruction
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	No sample taken
Remarks	Groundwater was not encountered.

PH28 (old tip near solvent recovery)

Ground Level – 0.60m	MADE GROUND (grassed over soft to firm brown clayey silt with some gravel of coal, sandstone, brick and round river gravel • roots to 0.50m)
0.60m – 1.60m	MADE GROUND (loose black ash clinker and coal with some sandstone gravel)
1.60m – 2.00m	MADE GROUND (soft brown and orange clayey silt with much gravel of red brick and some concrete)
2.00m – 3.00m	MADE GROUND (loose brown silty sand with much timber fragments)
3.00m – 4.00m	No recovery
4.00m – 5.00m	Soft grey and brown slightly sandy CLAY (possible made ground)
	END OF PROBEHOLE
Sample Depths / PID reading (ppm)	D1 0.30m - 0.50m / <1 D2 1.30m – 1.50m / 1 D3 4.10m – 4.30m / 22
Remarks	Slight groundwater entries at 3.20m. Hole collapsed below 3.50m.

PH29 (behind waste paint compactor)

Ground Level – 2.00m	MADE GROUND (loose brown and black slightly clayey silty sand with much black timber fragments and some sandstone gravel and cobbles)
2.00m – 3.00m	MADE GROUND (loose black ash and clinker with some sandstone
3.00m – 5.00m	10 per cent recovery comprising timber fragments and sandstone gravel
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.20m – 0.40m / 18 D2 1.50m – 1.70m / 23 D3 2.50m / 22
Remarks	Groundwater entries at 3.00m. Standpipe installed: ground level to 1.00m plain, 1.00m to 5.00m slotted.

PH30 (near paint drum crusher)

Ground Level – 0.10m	MADE GROUND (loose brown organic topsoil)
0.10m – 0.60m	MADE GROUND (soft to firm brown and grey clayey silt with a little gravel)
0.60m – 0.80m	MADE GROUND (loose limestone gravel)
0.80m – 1.00m	Brown weathered SANDSTONE
1.00m	SANDSTONE
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.30m – 0.50m / 311
Remarks	Groundwater was not encountered.

PH31 (solvent recovery)

Ground Level – 0.20m	MADE GROUND (reinforced concrete)
0.20m – 0.50m	MADE GROUND (loose limestone gravel in a sandy matrix)
0.50m – 0.90m	Soft to firm brown grey and black clayey SILT with a little gravel-possible made ground)
0.90m – 1.20m	Brown weathered SANDSTONE
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.50m – 0.70m / 23
Remarks	Groundwater was not encountered.

PH32 (solvent recovery)

Ground Level – 0.20m	MADE GROUND (reinforced concrete)
0.20m – 0.60m	MADE GROUND (loose limestone gravel in a brown sandy matrix)
0.60m – 1.30m	Soft to firm brown and grey clayey SILT with a little gravel
1.30m – 1.80m	Brown weathered SANDSTONE
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.80m – 0.90m / 53 D2 1.60m – 1.80m / 322
Remarks	Groundwater was not encountered.

PH33 (solvent recovery)

Ground Level – 0.20m	MADE GROUND (reinforced concrete)
0.20m – 0.40m	MADE GROUND (loose limestone gravel)
0.40m – 1.50m	Soft to firm brown and grey clayey SILT with a little sandstone gravel becoming clayey sandy silt below 0.60m
1.50m	OBSTRUCTION
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.40m – 0.50m / 60 D2 0.90m – 1.00m / 43
Remarks	Groundwater was not encountered.

PH34 (solvent recovery)

Ground Level – 0.20m	MADE GROUND (reinforced concrete)
0.30m	MADE GROUND (loose brick in a black ash matrix • solvent odour)
0.30m	OBSTRUCTION
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.30m / 1300
Remarks	Groundwater was not encountered.

PH35 (solvent recovery)

Ground Level – 0.20m	MADE GROUND (reinforced concrete)
0.20m – 0.50m	MADE GROUND (loose gravel of limestone in a brown sandy matrix)
0.50m – 2.00m	Soft to firm brown and grey clayey silt with a little gravel
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.60m – 0.70m / 119 D2 1.80m – 1.90m / 121
Remarks	Groundwater was not encountered. Standpipe installed to 1.60m; ground level to 0.60m plain, 0.60m to 1.60m slotted.

PH36 (in front of waste paint compactor)

Ground Level – 0.30m	MADE GROUND (moderately compact brown sand with occasional brick fragments)
0.30m – 0.50m	MADE GROUND (loose limestone gravel in a brown sandy matrix)
0.50m – 3.70m	MADE GROUND (thirty per cent recovery comprising loose gravel and cobbles of brick and sandstone Soft grey clayey sandy silt parting at 1.50m – 1.70m)
3.70m – 4.00m	Soft grey clayey SILT
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 1.60m – 1.80m / 34 D2 3.70m – 3.80m / 148
Remarks	Groundwater entries at 1.30m. Hole collapsed.

PH37 (inside solvent filling room)

Ground Level – 0.20m	MADE GROUND (concrete)
0.20m – 0.40m	MADE GROUND (loose gravel of limestone in a brown sand matrix)
0.40m – 1.50m	Soft to firm brown and grey clayey SILT
1.50m – 2.00m	Weathered SANDSTONE • solvent odour
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.40m – 0.50m / 32 D2 1.70m – 1.90m / 720
Remarks	Groundwater was not encountered.

PH38 (inside main building)

Ground Level – 0.14m	MADE GROUND (concrete)
0.14m – 0.55m	MADE GROUND (clayey sand and sandstone gravel)
0.55m – 0.60m	Weathered SANDSTONE
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.40m / 23
Remarks	Groundwater was not encountered.

PH39 (southeast corner of main building)

Ground Level – 0.17m MADE GROUND (concrete and fragments of brick)

0.17m – 0.27m MADE GROUND (concrete)

0.27m CONCRETE OBSTRUCTION

END OF PROBEHOLE

Sample depths / PID No samples taken
reading (ppm)

Remarks Groundwater was not encountered.

PH40 (behind car maintenance shed)

Ground Level – 0.50m	MADE GROUND (grey brown clayey sand and medium to coarse gravel)
0.50m – 1.75m	MADE GROUND (soft to firm red brown very sandy clay with a little medium to coarse sandstone gravel)
1.75m	OBSTRUCTION (sandstone or concrete)
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.30m – 0.40m / 24 D2 1.00m / 24
Remarks	Groundwater was not encountered.

PH41 (behind car maintenance shed)

Ground Level – 0.50m	MADE GROUND (grey clayey sand and fine to coarse gravel)
0.50m – 1.80m	MADE GROUND (soft to firm dark brown very sandy clay with a little coarse sandstone and brick gravel)
1.80m	OBSTRUCTION (possibly concrete)
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.80m – 0.90m / 26
Remarks	Groundwater was not encountered.

PH42 (near underground tanks at bottom of site)

Ground Level – 0.19m	MADE GROUND (concrete)
0.19m – 0.75m	MADE GROUND (black sand with a little fine to medium gravel, ash and wood fragments and some sandstone cobbles at depth)
0.75m – 0.90m	MADE GROUND (firm to stiff brown sandy clay with a little sandstone and brick gravel)
0.90m – 1.00m	MADE GROUND (black sandy ashy matrix)
1.00m – 1.50m	MADE GROUND (sandstone gravel)
1.50m – 3.70m	MADE GROUND (soft dark brown sandy silty clay • firm to stiff 1.90m – 2.00m and 3.40m – 3.60m • a little coarse gravel at 2.80m • window tube was wet below 2.00m with hydrocarbon sheen on water • hydrocarbon odour below 1.70m)
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	D1 0.50m / 358 D2 0.90m – 1.00m / 756 D3 1.70m / 7889 D4 2.80m / 1283 D5 3.50m / 2749
Remarks	Groundwater was not encountered. Standpipe installed to 3.70m; ground level to 1.00m plain, 1.00m to 3.70m slotted.

PH43 (inside main building)

Ground Level – 0.21m	MADE GROUND (concrete)
0.21m – 0.30m	MADE GROUND (sandstone gravel and sand)
0.30m – 0.50m	Weathered friable SANDSTONE
0.50m	OBSTRUCTION
	END OF PROBEHOLE

Sample depths / PID reading (ppm) No sample taken

Remarks Groundwater was not encountered.

PH44 (outside car maintenance shed)

Ground Level – 0.22m	MADE GROUND (reinforced concrete)
0.70m – 2.00m	MADE GROUND (loose black ash and clinker)
2.00m – 6.00m	MADE GROUND (ash gravel intermixed with layers of firm to stiff clay • slightly wet below 3.00m)
	END OF PROBEHOLE

Sample depths / PID reading (ppm) D1 1.00m / 32
D2 3.00m / 29

Remarks Slight groundwater entries below 3.00m.

PH45 (car park)

Ground Level – 0.10m	MADE GROUND (Tarmac)
0.10m – 0.50m	MADE GROUND (loose to moderately compact grey friable sandstone / siltstone fragments)
0.50m – 1.50m	MADE GROUND (loose to moderately compact grey ash with red brick gravel and cobbles)
1.50m – 2.30m	MADE GROUND (moderately compact orange sandstone cobbles and sand intermixed with firm to stiff dark brown sandy clay)
2.30m – 3.00m	MADE GROUND (stiff dark brown mottled grey slightly sandy silty clay with a little fine to medium gravel)
	END OF PROBEHOLE
Sample depths / PID reading (ppm)	0.80m – 0.90m / 32 2.50m – 2.70m / 27
Remarks	Groundwater was not encountered. Probehole collapsed below 1.00m.

BOREHOLE RECORDS

Date of Boring: 23 to 29 October 2002

Equipment: Dando (Shell and Auger) Light Cable Percussive Rig

Casing Size: 150mm

BH-1 (top of site)

Ground Level – 0.50m	MADE GROUND (soft to firm dark brown medium sandy clay with cobbles)
0.50m – 1.50m	Soft to firm becoming firm to stiff light brown to dark brown sandy CLAY
1.50m – 2.00m	Soft dark brown coarse sandy CLAY with sandstone cobbles
2.00m – 2.45m	Highly weathered light brown slightly clayey medium to coarse SANDSTONE
2.50m – 3.00m	Soft dark brown coarse very sandy CLAY with rounded gravel
3.00m – 3.30m	Moderately weathered SANDSTONE cobbles

END OF BOREHOLE

Remarks

50mm standpipe installed:
GL – 3.30m (2.80m slotted, 0.50m plain)
3.30m – 0.70m Washed Pea Gravel
0.70m - 0.20m Bentonite Pellets
0.20m – GL concrete
Groundwater was not encountered.

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.45m	7 6 3 5 9	23
2.00m – 2.45m	13 7 6 7 6	26
3.00m	No penetration	>50

BH 2 (car park)

Ground Level – 0.10m	MADE GROUND (Tarmac)
0.10m – 0.50m	MADE GROUND (dark brown gravelly sand with brick fragments)
0.50m – 2.50m	MADE GROUND (firm light brown to dark brown slightly sandy clay with some ash • moderately strong solvent odour to 1.50m)
2.50m - 3.00m	MADE GROUND (soft dark brown slightly sandy CLAY with occasional medium gravel)
3.00m – 4.0m	MADE GROUND (firm to stiff brown CLAY with occasional gravel and weathered sandstone fragments)
4.00m – 6.50m	Very stiff dark brown laminated micaceous CLAY and highly weathered laminated, fissile dark grey micaceous SHALE

END OF BOREHOLE

Remarks

50mm standpipe installed:
GL – 6.50m (4.50m slotted, 2.00m plain)
6.50m – 2.00m Washed Pea Gravel
2.00m – 0.50m Bentonite Pellets
0.50m - 0.20m Gravel
0.20m – GL Concrete
Groundwater was encountered at 3.00m. and the level rose quickly to 2.30m.

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.45m	3 2 2 1 2	7
2.00m – 2.45m	3 7 1 1 2	11
3.00m – 3.45m	5 3 1 5 2	11
4.00m – 4.45m	12 6 7 9 7	29
5.00m – 5.45m	13 7 7 9 10	33
6.00m – 6.45m	15 9 18 20 35	>50

BH-3 (car park)

Ground Level – 0.10m	MADE GROUND (Tarmac)
0.10m – 1.50m	MADE GROUND (dense dark brown / black sand with cobbles, ash and brick fragments)
1.50m – 1.80m	Light brown to red coarse grained SANDSTONE fragments
1.80m – 4.00m	Soft occasionally very soft dark brown slightly sandy CLAY with light brown sandstone fragments. Saturated between 3.50m and 4.0m.
4.00m – 6.50m	Stiff to very stiff dark brown CLAY with occasional sandstone fragments and medium gravel clasts of sandstone
END OF BOREHOLE	

Remarks

50mm standpipe installed:
GL – 6.50m (4.50m Slotted, 2.00m Plain)
6.50m – 2.00m Washed Pea Gravel
2.00m – 0.50m Bentonite Pellets
0.50m – GL Concrete
GL – Concrete
Groundwater was encountered at 3.00m and the level rose quickly to 1.90m

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.50m – 1.80m	20 35 35 - -	>50
2.00m – 2.45m	10 8 5 4 13	30
3.50m – 3.95m	3 2 2 1 1	6
4.00m – 4.45m	10 6 6 6 6	24
5.00m – 5.45m	10 6 7 6 6	25
6.50m - 6.95m	8 6 6 6 6	24

BH-4 (flower bed near offices))

Ground Level – 0.30m	MADE GROUND (topsoil)
0.30m – 0.50m	MADE GROUND (loose, moist light brown to dark brown slightly clayey sand with occasional pebbles and fragments of concrete)
0.50m – 1.00m	MADE GROUND (soft black to greenish grey clay with occasional gravel • possibly stained • slight odour)
1.00m – 1.45m	Interbedded soft to stiff dark brown to light brown CLAY with occasional fine gravel clasts
1.50m – 2.30m	Firm to stiff light brown to dark brown CLAY with occasional sandstone fragments and fine gravel
2.30m – 2.50m	Orange brown moderately weathered SANDSTONE • strong solvent odour
2.50m – 3.20m	Loose greenish brown clayey SAND/ sandy CLAY • strong solvent odour

END OF BOREHOLE

Remarks

50mm standpipe installed:
GL – 3.00m (1.50m slotted 1.50m plain).
3.00m – 1.40m washed pea gravel
1.40m – 0.50m Bentonite pellets
0.50m – GL concrete
Groundwater was encountered at 3.00m and rose quickly to 2.40m

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.45m	1 1 1 1 6	9
2.00m – 2.45m	6 6 5 5 6	22
3.00m – 3.20m	65 - - - -	>50

BH-5 (reservoir)

Ground Level – 4.50m

MADE GROUND (loose clayey coarse sand fill with brick fragments and a layer of soft to firm dark brown clay)

END OF BOREHOLE

Remarks

50mm standpipe installed:
GL – 4.50m (3.50m slotted, 1.00m plain)
4.50m – 0.90m Washed Pea Gravel
0.90m – 0.20m Bentonite Pellets
0.20m – GL
Groundwater was encountered at 1.00m

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.15m	30 - - - -	>50
3.10m – 3.45m	10 20 20 20 20	>50

BH-6 (solvent recovery plant)

Ground Level – 0.30m	MADE GROUND (reinforced concrete • Hydrocarbon odour)
0.30m – 1.00m	MADE GROUND (loose brown gravel of sandstone and brick in a brown sandy matrix • Solvent odours)
1.00m – 1.45m	Soft brown clayey SILT • Solvent odours)
1.45m – 3.50m	Soft brown and grey clayey SILT
3.50m	Weathered SANDSTONE
	END OF BOREHOLE

Remarks

50mm standpipe installed:
GL – 3.50m (2.00m slotted 1.50m plain).
Groundwater was not encountered.

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.95m	6/4/5/6/6	21
2.50m – 2.95m	7/7/6/8/7	28

BH-7 (adjacent to former quarry)

Ground Level – 0.2m	Topsoil
0.2m – 1.0m	Firm brown sandy CLAY
1.0 -m – 1.6m	Orange brown weathered SANDSTONE

BOREHOLE ABANDONED

Remarks

Borehole abandoned at 1.6m No further progress possible

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.1m	60	60
1.5m – 1.6m	50	50

BH-8 (above ground tank)

Ground Level – 0.10m	Tarmac
0.1m – 0.20m	MADE GROUND (loose gravel of limestone)
0.20m – 1.40m	MADE GROUND (loose gravel and cobbles of sandstone)
1.4m-1.6m	Black slag-based concrete
	BOREHOLE ABANDONED

Remarks

Borehole abandoned at..after intercepting concrete obstruction.
No further progress possible.

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.5m – 1.6m	50	50

BH-9 (the croft)

Ground Level – 0.30m	MADE GROUND (limestone gravel)
0.30m – 1.00m	MADE GROUND (firm dark brown very sandy clay with some broken brick and coarse sandstone gravel)
1.00m – 3.00m	MADE GROUND (loose to moderately compact black ash and clinker with pockets of stiff silty clay)
3.00m – 5.00m	MADE GROUND (firm dark brown very sandy fine to medium gravely clay with a little brick, sandstone, metal and pottery fragments)
5.00m – 11.00m	MADE GROUND (loose to moderately compact black clayey ash with a little brick fragments, sandstone fragments and rusty metal pieces)
11.00m – 13.00m	Soft to firm dark brown very sandy CLAY with a little medium to coarse sandstone gravel (possible made ground)
13.00m – 14.00m	Moderately to highly weathered grey MUDSTONE weak to moderately strong
	END OF BOREHOLE

Remarks

50mm standpipe installed:
GL – 13.0m (12.0m slotted 1.0m plain).
14.00m – 13.00m Bentonite pellets
13.00m – 1.00m washed pea gravel
1.00m – 0.20m Bentonite pellets
0.20m – GL concrete
Groundwater was not encountered.

IN SITU TESTING BH9

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.45m	5 4 4 4 6	18
2.00m – 2.45m	6 7 4 3 3	17
3.00m – 3.45m	3 2 1 2 2	7
4.00m – 4.45m	4 3 3 2 2	10
5.00m – 5.45m	3 2 3 1 2	8
6.00m – 6.45m	3 3 2 2 3	10
7.00m – 7.45m	4 4 3 3 2	12
8.00m – 8.45m	3 2 2 2 2	8
9.00m – 9.45m	3 2 1 1 3	7
10.00m – 10.45m	3 2 3 3 2	10
11.00m – 11.45m	6 5 3 3 2	13
12.00m – 12.45m	4 4 3 3 4	14
13.00m – 13.45m	50	>50

BH-10 (underground tanks)

Ground Level – 0.15m	MADE GROUND (concrete)
0.15m – 0.70m	MADE GROUND (firm dark brown sandy clay with red brick fragments - hydrocarbon odour)
0.70m – 1.50m	MADE GROUND (firm to stiff dark brown sandy clay with a little ash, fine to medium gravel and broken sandstone fragments)
1.50m – 4.00m	Firm dark brown sandy silty in places CLAY with a little subrounded and subangular medium gravel and medium coal fragments (possible made ground due to non-uniform texture)
4.00m – 4.50m	Stiff dark brown very silty CLAY with a little fine to medium gravel
4.50m – 5.00m	Stiff dark brown very silty CLAY with much weathered sandstone becoming less clayey with depth
5.00m – 5.50m	Weathered pale orange SANDSTONE
	END OF BOREHOLE

Remarks

50mm standpipe installed:
GL – 4.50m (2.50m slotted 2.00m plain).
5.50m – 4.50m Bentonite pellets
4.50m – 1.50m washed pea gravel
1.50m – 0.50m Bentonite pellets
0.50m – GL concrete
Groundwater was not encountered.

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.45m	4 3 3 8 2	16
2.00m – 2.45m	6 6 7 7 7	27
3.00m – 3.45m	7 6 5 7 8	26
4.00m – 4.45m	10 5 5 6 9	25
5.00m – 5.45m	50	>50

BH 11 (underground tanks)

Ground Level – 3.00m MADE GROUND (soft dark brown very sandy ashy clay with a little broken sandstone and sandstone boulders)

- very soft and wet in places
- slight hydrocarbon odour)

3.00m – 3.50m Weathered pale orange SANDSTONE

END OF BOREHOLE -

Remarks

50mm standpipe installed:
GL – 3.0m (2.0m slotted 1.0m plain).
3.50m – 3.00m Bentonite pellets
3.00m – 1.00m washed pea gravel
1.00m – 0.20m Bentonite pellets
0.20m – GL concret
Groundwater was encountered as a slow water entry at 2.00m, standing at 3.00m

IN SITU TESTING

Depth (m)	SPT Test 150/75/75/75/75mm Interval	SPT 'N' Value
1.00m – 1.45m	5 5 2 2 2	11
2.00m – 2.45m	4 2 3 3 4	12
3.50m – 3.95m	3 4 7 9 25	45
4.00m – 4.45m	50	>50

APPENDIX D

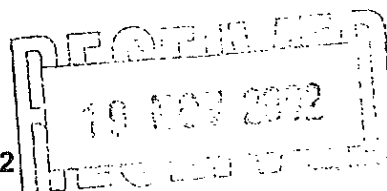
Laboratory Analytical Certificates

Test Report



Report No **02/005 / 10232**

Date **12 November 2002**



To Client **RSK Environment Ltd**
Client's Representative **Ms P Marshall**
cc

The report presents test certificate(s) which identify test measurements and results on samples received in our laboratory on **06/11/02** in connection with your contract/project at **Walmersley**

The certificate(s) also presents information relating to the origin, source or location, material or type description or other identification supplied for reference.

Test methods or adopted procedures are identified on each certificate. Where a test specification has been advised against which the sample is to be assessed, a statement is included regarding whether or not the sample complies.

Where applicable, relevant support documents are appended.

The report content is contained as appendix sheets, as below:-

<u>Description</u>	<u>Quantity</u>	<u>Test Date</u>	<u>Appendix Sheet No(s)</u>
Sulphate	6	08-11/11/02	SS1-SS2
pH Value	6	08-11/11/02	SS1-SS2

Signed for AMEC Capital Projects Limited

P Thomas
Laboratory Manager

AMEC Group Limited
Leonard Fairclough House
Church Street Adlington Chorley
Lancashire PR7 4LB
United Kingdom

Infrastructure Division
Specialist Businesses
Tel +44 (0)1257 484574
Fax +44 (0)1257 484575

This report shall not be reproduced except in full, without written approval of the laboratory. The results presented in this report relate only to the items tested.

Sample Disposal Notice



Report No 02/005 / 10232
Date 12 November 2002
Project Walmersley
Client RSK Environment Ltd
Client's Representative Ms P Marshall

Samples received in the Permanent Laboratory on 06/11/02 in connection with the
above project: -

- ☐ were used during test
☐ are disposed immediately following test
☒ will be disposed of by 12/12/02

(If you wish to make alternative arrangements, please contact the undersigned at least five working days prior to this date, confirming your requirements in writing)

Signed for AMEC Capital Projects Limited

P Thomas
Laboratory Manager

AMEC Capital Projects Limited
Leonard Fairclough House
Church Street Adlington Chorley
Lancashire PR7 4LB
United Kingdom

Construction Division
Specialist Businesses
Tel +44 (0)1257 484574
Fax +44 (0)1257 484575

Chemistry Laboratory Certificate

Client RSK Environmental Ltd

Site Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR
10462

Date Tested 19/11/02

Methodology 17

Sample Type Solid

Results

Date Reported 19 November, 2002
Date Received 8 November, 2002
Certificate No. 02/4719/50/C1
File No. 02/4719/50
Client Ref. ENS014248

Sample Ref	Lab Ref.	Calorific Value cal/g # *
TP7 2.0M	N152466	<500
BH9 1.0-3.0M	N152467	<500

Tests marked # are not UKAS accredited in this certificate and are not included in the UKAS Accreditation Schedule for our laboratory.
Analysis marked * indicates subcontracted analyses.

Any information relating to the sample received for testing has been supplied by the client unless otherwise specified

Prepared by:

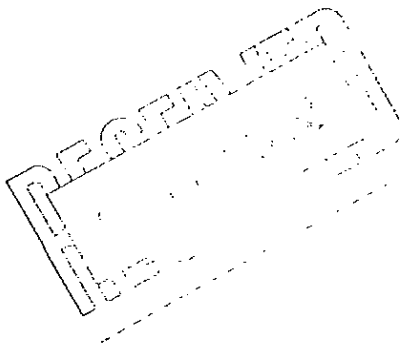
C. Tarbuck

C Tarbuck
Account Manager

Approved by:

J. Gustafson

J Gustafson
Laboratory Manager



Sulphate Content

BS 1377: Part 3: 1990

pH Value

BS 1377: Part 3: 1990: Method 9.5



Client: RSK Environment Ltd

Contract: Walmersley

Borehole Trial Pit No.	Depth (m)	Sample Type	Sample No.	Site Ref	Description of Material	% Passing 2mm Sieve	Sulphate Content (SO ₄)				pH Value
							Water g/L (1)	2:1 Water/ Soil Ext (g/L)/% (2)	Acid Extract % (3)	Test Method 5.5/5.6	
PH44	1.00	JAR	014420	N/A	Black ASH (Made ground)	N/A	-	0.11	-	5.6**	4.6
TP2	0.60	JAR	014421	N/A	Orange sandy CLAY with fine/medium gravel	80	-	0.07	-	5.6	3.6

NOTES:

- (4) Preparation: Clause 5.4 Test Method 5.5 - Gravimetric Method
- (2) Preparation: Clause 5.3 Test Method 5.6 - Ion-exchange Method
- (3) Preparation: Clause 5.2 *Delete as appropriate*

**** Modified test due to sample size and nature of material**

AMEC Capital Projects Limited
Leonard Fairclough House
Church Street Adlington Chorley
Lancashire PR7 4LB
United Kingdom

Construction Division
Specialist Businesses
Tel +44 (0)1257 484574
Fax +44 (0)1257 484575

Report No 02/005 / 10232
Appendix Sheet No SS2

www.amec.com

Form No SS/R/0497

Chemistry Laboratory Certificate

Client RSK Environmental Ltd

Site Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR
10462

Date Tested 19/11/02

Methodology 17

Sample Type Solid

Results

Date Reported 19 November, 2002
Date Received 8 November, 2002
Certificate No. 02/4719/50/C1
File No. 02/4719/50
Client Ref. ENS014248

Sample Ref	Lab Ref.	Calorific Value cal/g # *
TP7 2.0M	N152466	<500
BH9 1.0-3.0M	N152467	<500

Tests marked # are not UKAS accredited in this certificate and are not included in the UKAS Accreditation Schedule for our laboratory.
 Analysis marked * indicates subcontracted analyses.

Any information relating to the sample received for testing has been supplied by the client unless otherwise specified

Prepared by:

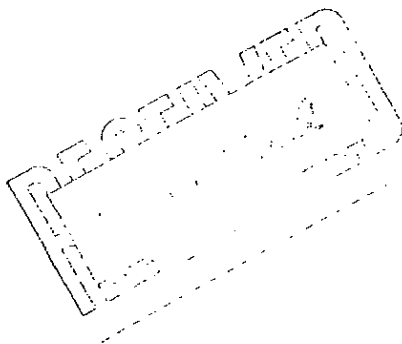
C Tarbuck

C Tarbuck
Account Manager

Approved by:

J Gustafson

J Gustafson
Laboratory Manager



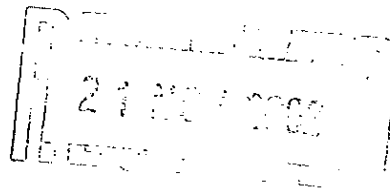
Test Report



Report No 02/005 / 10238

Date 15 November 2002

To Client RSK Environmental
Client's Representative P Walton
cc



The report presents test certificate(s) which identify test measurements and results on samples received in our laboratory on 11/11/02 in connection with your contract/project at **Walmersley**

The certificate(s) also presents information relating to the origin, source or location, material or type description or other identification supplied for reference.

Test methods or adopted procedures are identified on each certificate. Where a test specification has been advised against which the sample is to be assessed, a statement is included regarding whether or not the sample complies.

Where applicable, relevant support documents are appended.

The report content is contained as appendix sheets, as below:-

<u>Description</u>	<u>Quantity</u>	<u>Test Date</u>	<u>Appendix Sheet No(s)</u>
Moisture Content	4	12-13/11/02	IP1
Plasticity Index	4	13-15/11/02	IP1
Loss on Ignition	4	14-15/11/02	LOI1

Signed for AMEC Capital Projects Limited

P Thomas
Laboratory Manager

AMEC Group Limited
Leonard Fairclough House
Church Street Adlington Chorley
Lancashire PR7 4LB
United Kingdom

Infrastructure Division
Specialist Businesses
Tel +44 (0)1257 484574
Fax +44 (0)1257 484575

This report shall not be reproduced except in full, without written approval of the laboratory. The results presented in this report relate only to the items tested.

Sample Disposal Notice



Report No **02/005 / 10238**

Date **15 November 2002**

Project **Walmersley**

Client **RSK Environmental**

Client's Representative **P Walton**

Samples received in the Permanent Laboratory on **11/11/02** in connection with the
above project: -

- ☐ were used during test
- ☐ are disposed immediately following test
- ☐ will be disposed of by **15/12/02**
*(If you wish to make alternative arrangements, please contact the undersigned at least five
working days prior to this date, confirming your requirements in writing)*

Signed for AMEC Capital Projects Limited

P Thomas
Laboratory Manager

AMEC Capital Projects Limited
Leonard Fairclough House
Church Street Adlington Chorley
Lancashire PR7 4LB
United Kingdom

Construction Division
Specialist Businesses
Tel +44 (0)1257 484574
Fax +44 (0)1257 484575

Index Properties

BS 1377: Part 2: 1990
Method 4.3, 5.3 + 5.4



Client: RSK Environmental

Contract: Walmersley

Borehole Trial Pit No.	Depth (m)	Sample Type	Sample No	Site Ref	Description of Material Tested	% Passing 425µm Sieve	Natural Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index
TP10	1.50- 1.70	BULK	94787	TP10	Brown sandy CLAY with fine/medium sized gravel	77	21	38	20	18
BH1	0.50- 1.00	JAR	014422	BH1	Brown/black sandy CLAY with fine/medium sized gravel	75	23	36	22	14
BH6	1.00- 1.50	JAR	014423	BH6	Brown sandy CLAY with fine/medium sized gravel	79	20	31	18	13
BH10	1.50- 2.00	JAR	014425	BH10	Very wet brown/black clayey SILT	77	16	N/A	N/A	Non Plastic

Sample Preparation
☐ Natural State (Part 2, Method 4.2.3)
☐ Wet Sieving (Part 2, Method 4.2.4)
☒ Air Drying (Part 1, Methods, 7.3.4 + 7.3.5)

NOTES: Moisture content tested in accordance with BS 1377: Part 2: Method 3.2

AMEC Capital Projects Limited
Leonard Fairclough House
Church Street Adlington Chorley
Lancashire PR7 4LB
United Kingdom

Construction Division
Specialist Businesses
Tel +44 (0)1257 484574
Fax +44 (0)1257 484575

Report No: 02/005 / 10238
Appendix Sheet No: IP1

www.amec.com

Form No. IP/R/0494

Loss on Ignition

BS 1377: 1990: Part 3: Method 4.3



Client: **RSK Environmental**

Contract: **Walmersley**

Borehole Trial Pit No	Depth (m)	Sample Type	Sample No	Site Ref	Description of Material	Passing 2mm (%)	Mass Loss on Ignition (%)
TP7	2.00	BULK	94786	TP7	Brown fine/medium ash type material	56	14
BH9	1.00- 3.00	JAR	014424	BH9	Dark brown CLAY with much ash type gravel	83	5.1
BH11	1.00- 1.45	JAR	014426	BH11	Dark brown sandy CLAY with fine/medium sized gravel	81	7.1
PH29	1.50- 1.70	JAR	014427	PH29	Orange/brown sandy CLAY with much fine/medium gravel	76	6.7

NOTES:

AMEC Capital Projects Limited
Leonard Fairclough House
Church Street Adlington Chorley
Lancashire PR7 4LB
United Kingdom

Construction Division
Specialist Businesses
Tel +44 (0)1257 484574
Fax +44 (0)1257 484575

Project No: **02/005 / 10238**

Appendix Sheet No: **LO11**

www.amec.com

Form No: **LOI/R/1098**



AIRBORNE ENVIRONMENTAL CONSULTANTS LTD

21-22 Leslie Hough Way, Salford University Business Park, Salford M6 6AJ

Tel.: 0161 745 7575 Fax: 0161 745 7577

Email: aec@aec.uk.net Web: www.aec.uk.net

Page 1 of 1

CERTIFICATE OF BULK FIBRE ANALYSIS

PROJECT REF: A4729

CLIENT ENSR International Ltd.,

DETAILS: 172 Chester Road,

Helsby,

Cheshire.

WA6 0AR

CERT NO.: C4729

DATE RECEIVED: 06.11.02.

DATE ANALYSED: 13.11.02.

DATE REPORTED: N/A

(verbal)

DATE REPORTED: 14.11.02.

(document)

SITE DETAILS: Unknown

SAMPLED BY: Client

Sample No.	Sample Location	Sample Description	Asbestos Type(s)	Estimated * Content (%)
A4729 01	Project No. 10468. Ref no. 1 - PH16.	Brown soil / rusty fragments / fibrous board fragments.	Amosite	15 to 50
A4729 02	Project No. 10468. Ref No. 2 - PH14.	White / grey paper, soil, gravel, misc. debris / woven fabric.	Chrysotile	15 to 50
A4729 03	Project No. 10468. Ref No. 3 - PH45.	Reddish brick fragments / clinker / soil.	NAD	N/A
A4729 04	Project No. 10468. Ref No. 4 - PH26.	Brown soil / gravel / clinker.	NAD	N/A
A4729 05	Project No. 10468. Ref No. 5 - PH29.	Brown soil / gravel / coal / fibrous fragments.	Amosite Chrysotile	0.08-0.15 0.08-0.15

Comments:

UKAS accredited for identification and site sampling.

All analysis in accordance with MDHS 77, 'Asbestos in bulk materials'- Sampling and identification by polarised light microscopy (PLM), June 1994.

Opinions and interpretations expressed herein, and tests marked '*' in this report/certificate are outside the scope of UKAS accreditation.

Descriptions marked '**' in this report/certificate denote information supplied by client.

N.B. AEC cannot take responsibility for the accuracy and representative nature of samples taken by clients.

Asbestos types: Chrysotile = white asbestos; Amosite = brown asbestos; Crocidolite = blue asbestos

Tremolite; Actinolite; Anthophyllite. NAD = No Asbestos Detected.

Signed: For and on behalf of Airborne Environmental Consultants Ltd. Print: IAN WA	Date: 14/11/02
---	-----------------------

Form UK 25

Issue Date: 14/11/02

At: 017

Company Reg No. 3442515

Liverpool Office 11 Blacklow Brow, Huyton, Merseyside L36 5XE Tel. 0151 480 4363

Issue 2, Revision 0 15.10.01

Date: 14 November 2002
Your ref: 10468
Our ref: 10468-040

EnviroLab
Units 7&8
Sandpits Business Park
Mottram Road
Hyde
Cheshire
SK14 3AR
UKAS TESTING
Laboratory No. 1247

Test Report

Sample(s) of Water from Tetrosyl, Walmersley.

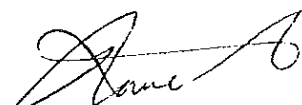
Received from ENSR Land Assessment Department, Helsby.
237 Chester Road
Helsby
Cheshire
WA6 0AR

Date of receipt 08 November 2002
Date of analysis 11 November 2002

Method Statement

TPH and BTEX analysis is performed in accordance with procedure A-T-007.

VOC analysis is performed in accordance with procedure A-T-006.



David Elo

Laboratory Supervisor

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Tests marked "" in this report are not included in the UKAS Accreditation Schedule for the laboratory.

Analytical results reflect the quality of the sample at the time of analysis only.

EnviroLab Ref. No.	27747
Location	PH42W2
TPH	30,000
Comments	H/C Range C ₆ -C ₂₃
Total BTEX above reporting limits.	26,945
Benzene	45
Toluene	21,000
Ethylbenzene	1,500
Xylene	4,400

Table 1 – Water TPH and BTEX Results (ppb)

EnviroLab Ref. No.	27747 #
Location	PH42W2
Trichlorofluoromethane	<1,000
1,1 Dichloroethene	<1,000
Trans 1,2 Dichloroethene	<1,000
1,1 Dichloroethane	<1,000
Chloroform	<1,000
1,1,1 Trichloroethane	<1,000
1,2 Dichloroethane	<1,000
Carbon Tetrachloride	<1,000
1,2 Dichloropropane	<1,000
Trichloroethene	<1,000
Bromodichloromethane	<1,000
cis 1,3 Dichloropropene	<1,000
Trans 1,3 Dichloropropene	<1,000
1,1,2 Trichloroethane	<1,000
Dibromochloromethane	<1,000
Tetrachloroethene	<1,000
Chlorobenzene	<1,000
Bromoform	<1,000
1,1,2,2 Tetrachloroethane	<1,000
1,2 Dichlorobenzene	<1,000
1,4 Dichlorobenzene	<1,000
1,3 Dichlorobenzene	<1,000

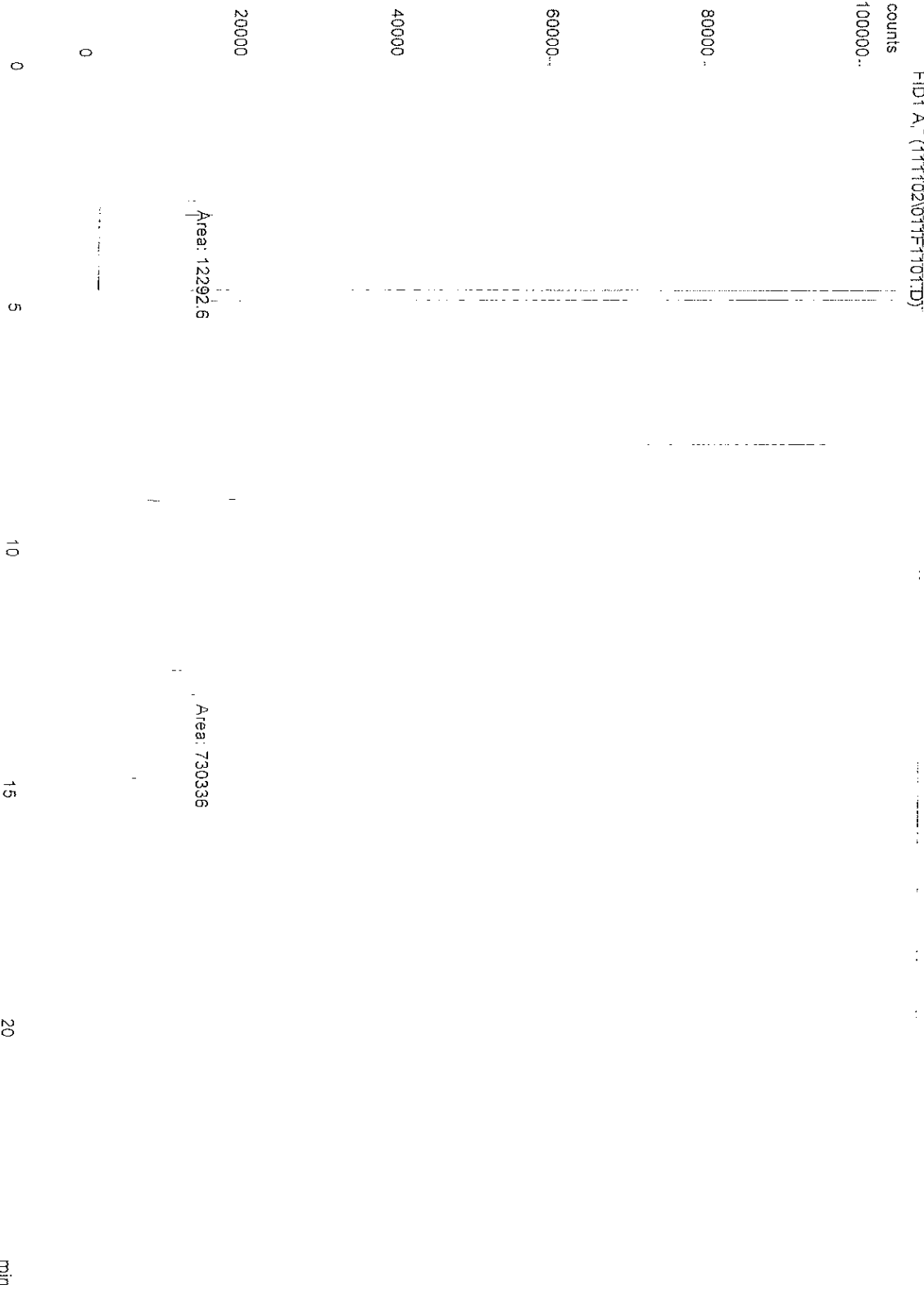
Table 2 – Water VOC Results (ppb)

- Increased reporting limits due to smaller sample size.

=====

Injection Date	: 11/11/02 11:21:25 PM	Seq. Line	: 11
Sample Name	: 27747	Vial	: 11
Acq. Operator	: lg	Inj	: 1
		Inj Volume	: 1 µl

Acq. Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 10/18/02 5:21:11 PM by lg de
Analysis Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 11/11/02 10:33:54 AM by de lg
(modified after loading)
TPH method for HP5890



Date: 06 November 2002
Your ref: 10468
Our ref: 10468-030

ENSR Laboratory
Units 7&8
Sandpits Business Park
Mottram Road
Hyde
Cheshire
SK14 3AR
UKAS TESTING
Laboratory No. 1247

Test Report

Sample(s) of Water from Tetrosyl, Walmersley.

Received from ENSR Land Assessment Department, Helsby.
237 Chester Road
Helsby
Cheshire
WA6 0AR

Date of receipt 04 November 2002
Date of analysis 04 November 2002

Water
- TPH BTEX
- VOC

Method Statement

TPH and BTEX analysis is performed in accordance with procedure A-T-007.

VOC analysis is performed in accordance with procedure A-T-006.



Louise Goddard

Analytical Chemist

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Tests marked "" in this report are not included in the UKAS Accreditation Schedule for the laboratory.

Analytical results reflect the quality of the sample at the time of analysis only.

ENSR Ref. No.	27685	27686	27687	27688	27689
Location	BH2 W2	BH4 W1	BH5 W2	BH10 W1	BH6 W2
TPH	<50	1,600	<50	<50	8,500
Comments	-	H/C Range C ₆ -C ₉	-	-	H/C Range C ₆ -C ₉
Total BTEX above reporting limits.	0	2,185	0	24	10,998
Benzene	<2	<2	<2	<2	18
Toluene	<2	35	<2	<2	8,300
Ethylbenzene	<2	550	<2	6	780
Xylene	<2	1600	<2	18	1,900

Table 1 – Water TPH and BTEX Results (ppb)

ENSR Ref. No.	27685	27686	27687	27688	27689
Location	BH2 W2	BH4 W1	BH5 W2	BH10 W1	BH6 W2
Trichlorofluoromethane	<5	<5	<5	<5	<5
1,1 Dichloroethene	<5	<5	<5	<5	<5
Trans 1,2 Dichloroethene	<5	<5	<5	<5	<5
1,1 Dichloroethane	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	<5	<5
1,1,1 Trichloroethane	<5	<5	<5	<5	<5
1,2 Dichloroethane	<5	<5	<5	<5	<5
Carbon Tetrachloride	<5	<5	<5	<5	<5
1,2 Dichloropropane	<5	<5	<5	<5	<5
Trichloroethene	<5	<5	<5	<5	<5
Bromodichloromethane	<5	<5	<5	<5	<5
cis 1,3 Dichloropropene	<5	<5	<5	<5	<5
Trans 1,3 Dichloropropene	<5	<5	<5	<5	<5
1,1,2 Trichloroethane	<5	<5	<5	<5	<5
Dibromochloromethane	<5	<5	<5	<5	<5
Tetrachloroethene	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5
Bromoform	<5	<5	<5	<5	<5
1,1,2,2 Tetrachloroethane	<5	<5	<5	<5	<5
1,2 Dichlorobenzene	<5	<5	<5	<5	<5
1,4 Dichlorobenzene	<5	<5	<5	<5	<5
1,3 Dichlorobenzene	<5	<5	<5	<5	<5

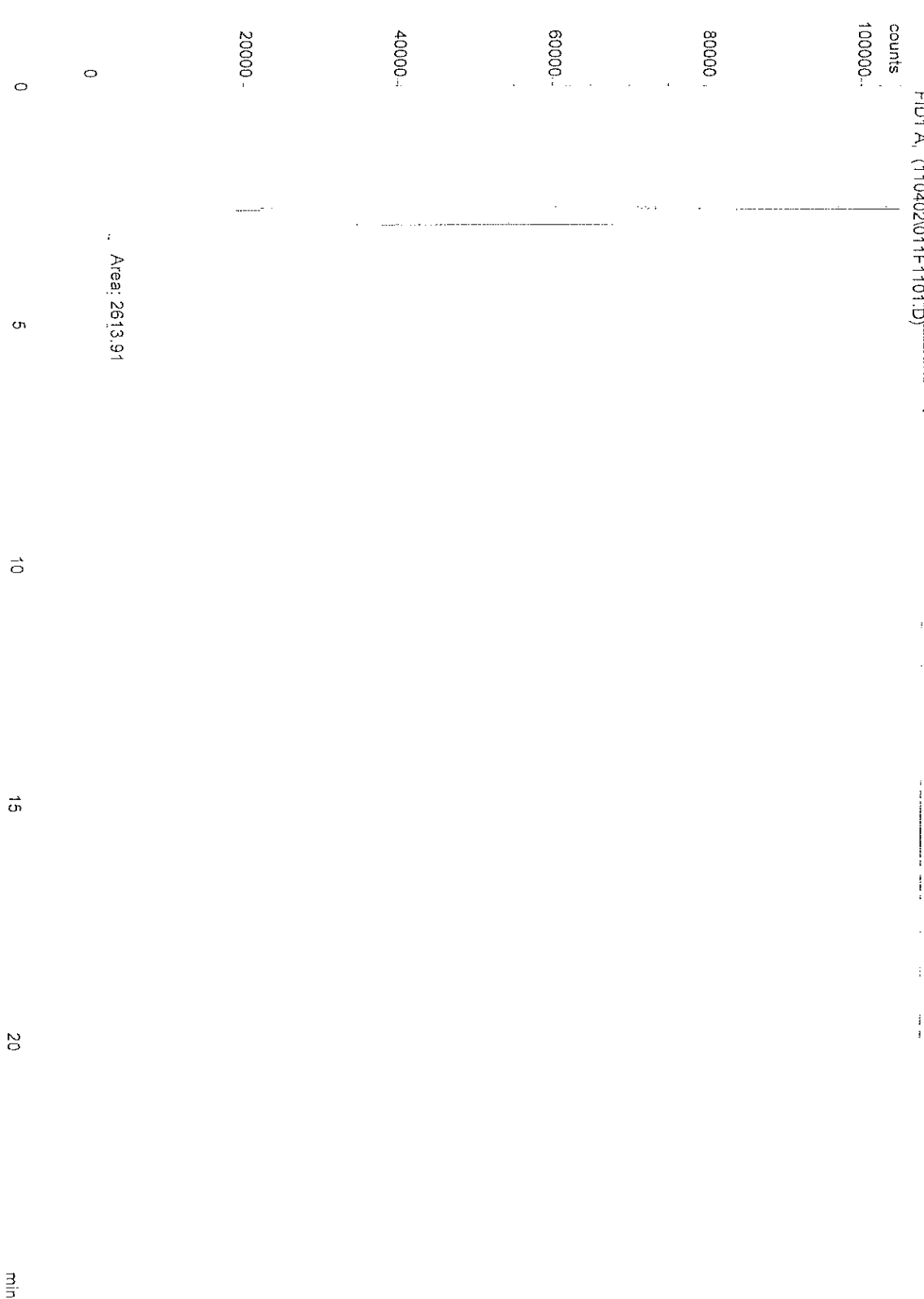
Table 2 – Water VOC Results (ppb)

=====

Injection Date	: 11/4/02 11:55:41 PM	Seq. Line	: 11
Sample Name	: 27685	Vial	: 11
Acq. Operator	: lg	Inj	: 1
		Inj Volume	: 1 µl

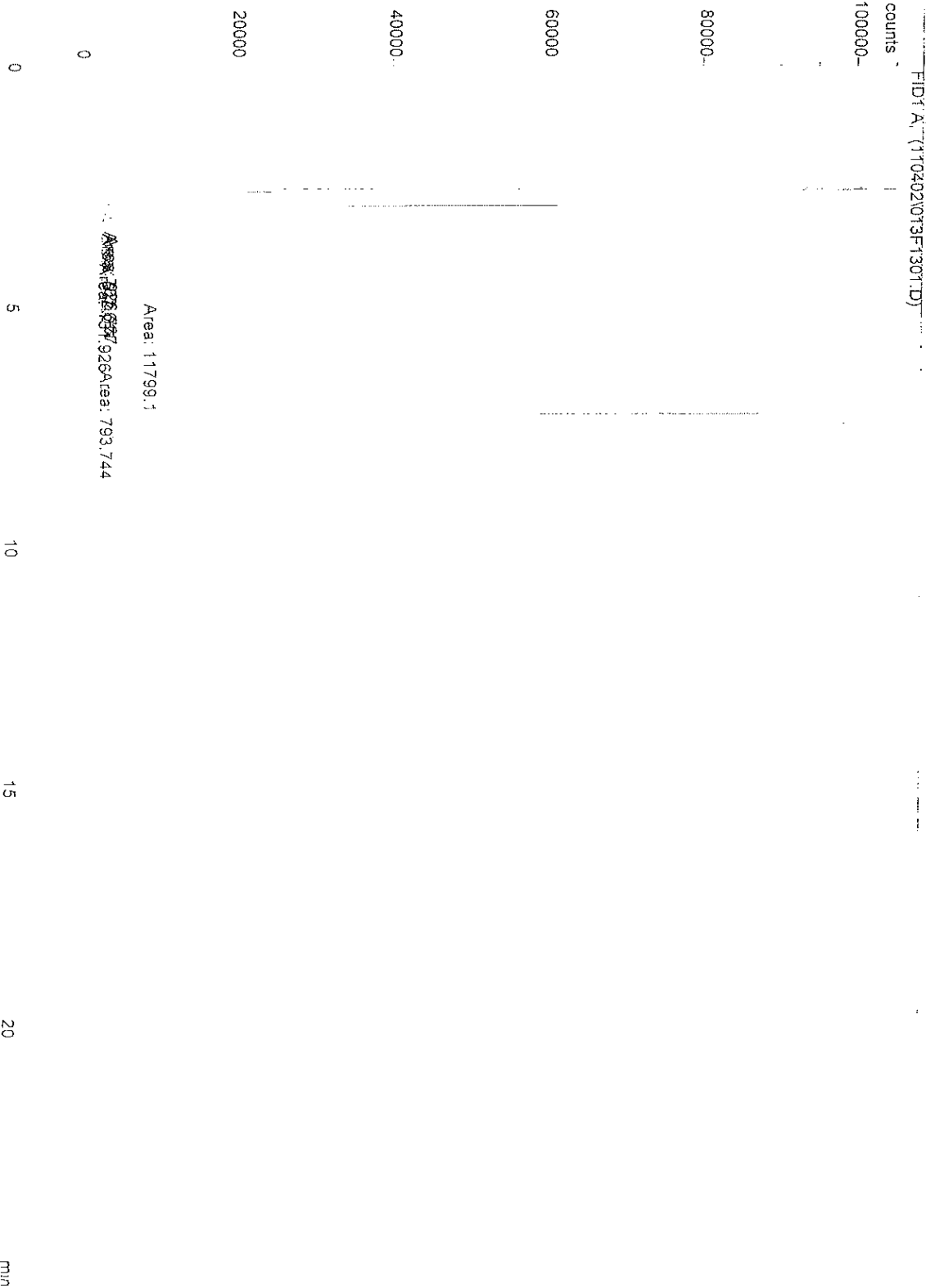
Acq. Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 10/18/02 5:21:11 PM by lg de
Analysis Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 11/5/02 9:55:48 AM by de lg
(modified after loading)

TPH method for HP5890



=====

Injection Date	: 11/5/02 1:09:16 AM	Seq. Line	: 13
Sample Name	: 27686	Vial	: 13
Acq. Operator	: lg	Inj	: 1
		Inj Volume	: 1 µl
Acq. Method	: C:\HPCHEM\1\METHODS\WATER1.M		
Last changed	: 10/18/02 5:21:11 PM by lg de		
Analysis Method	: C:\HPCHEM\1\METHODS\WATER1.M		
Last changed	: 11/5/02 9:55:48 AM by de lg		
	(modified after loading)		
TPH method for HP5890			

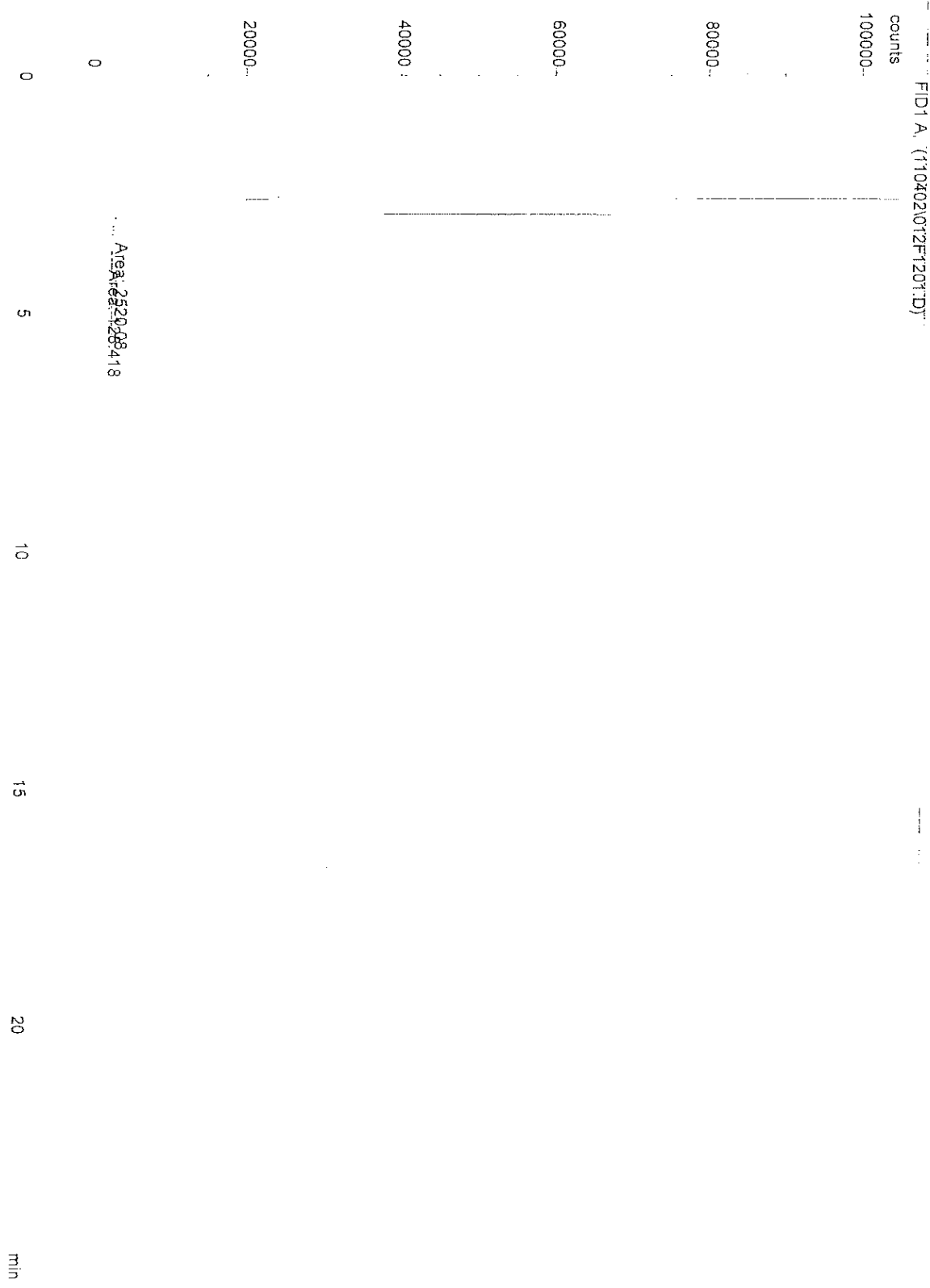


=====

Injection Date	: 11/5/02 12:32:32 AM	Seq. Line	: 12
Sample Name	: 27687	Vial	: 12
Acq. Operator	: lg	Inj	: 1
		Inj Volume	: 1 µl

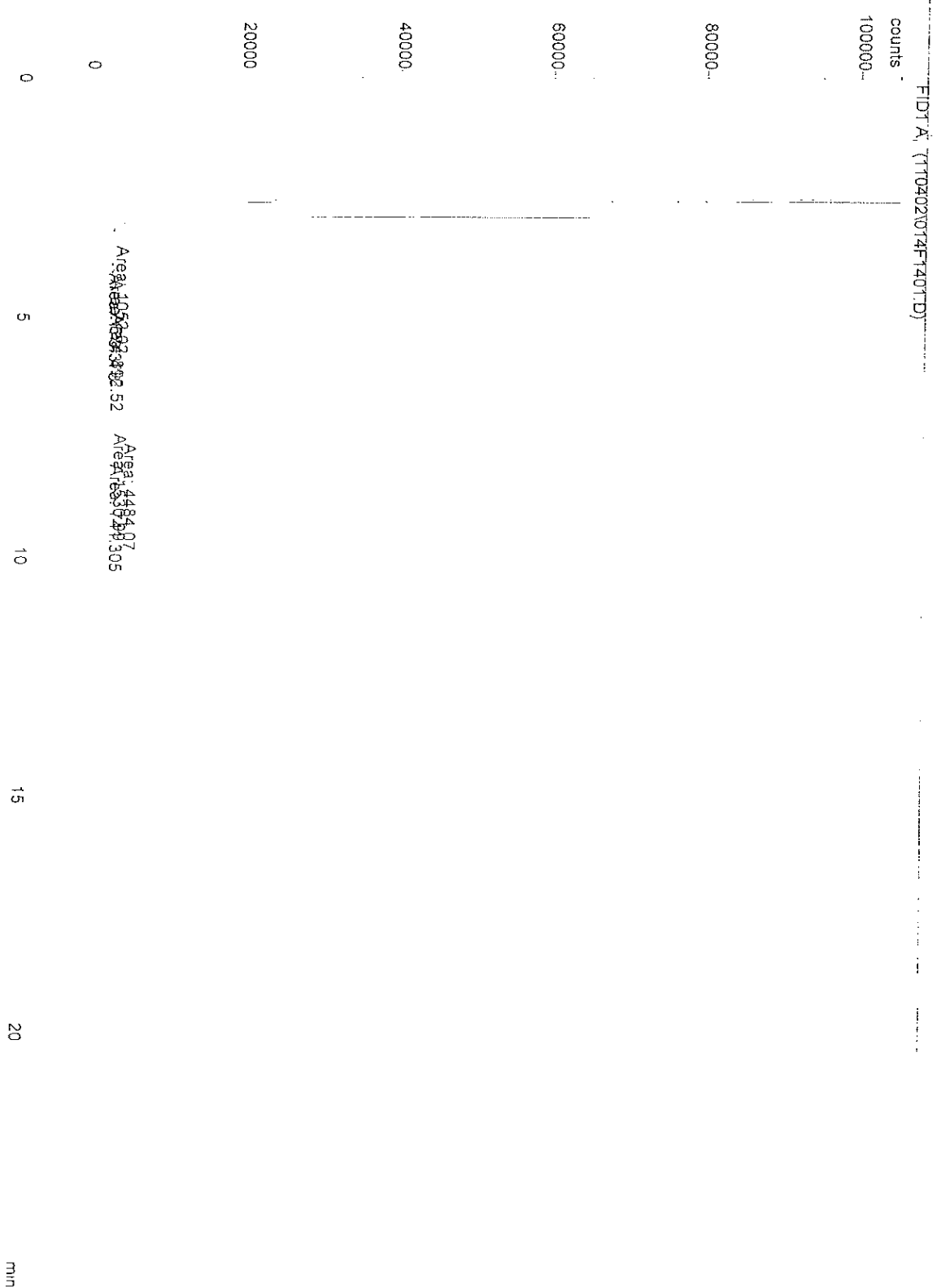
Acq. Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 10/18/02 5:21:11 PM by lg de
Analysis Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 11/5/02 9:55:48 AM by de lg
(modified after loading)

TPH method for HP5890



=====
Injection Date : 11/5/02 1:45:51 AM Seq. Line : 14
Sample Name : 27688 Vial : 14
Acq. Operator : lg Inj : 1
 Inj Volume : 1 µl

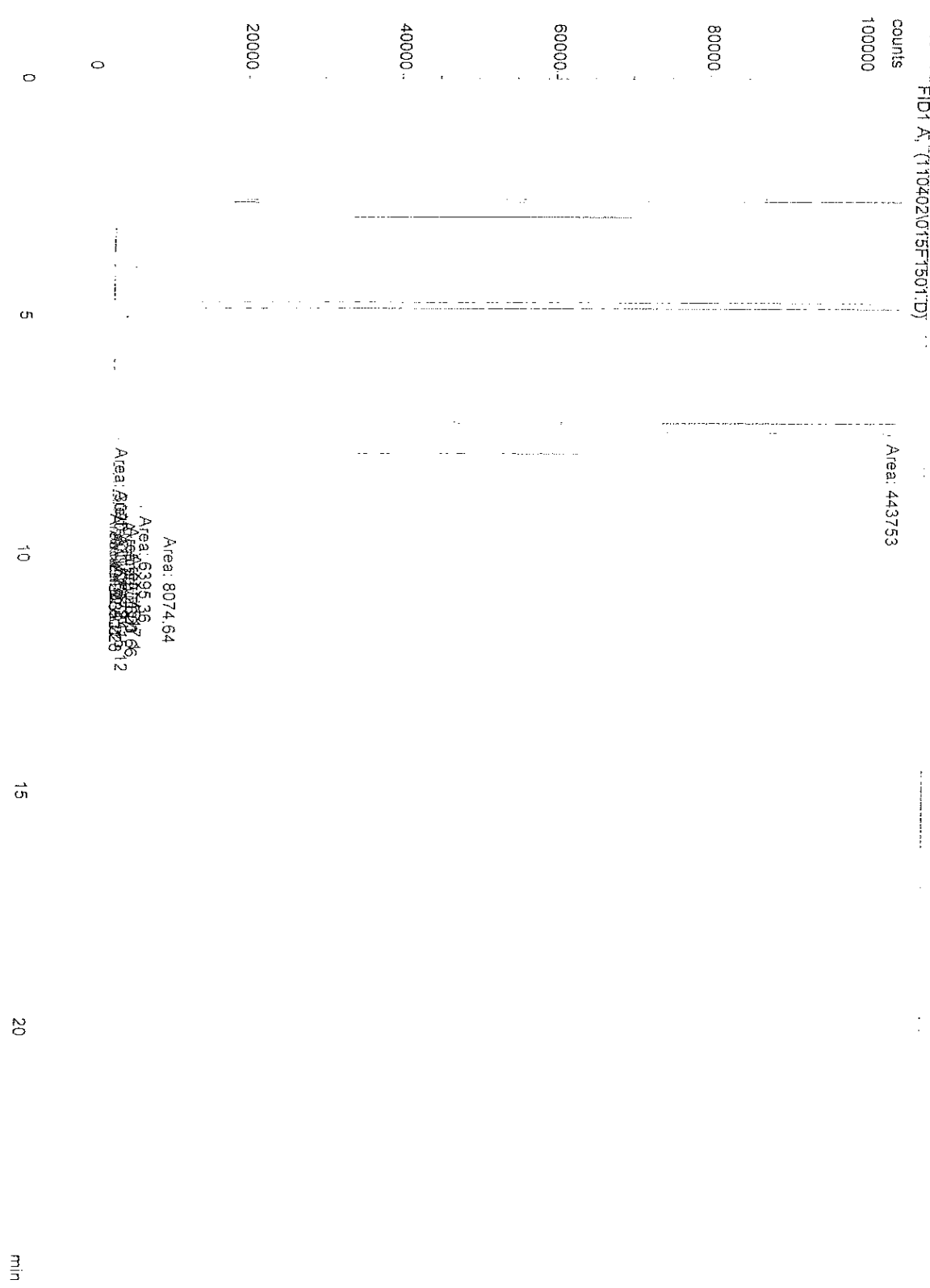
Acq. Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 10/18/02 5:21:11 PM by lg de
Analysis Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 11/5/02 9:55:48 AM by de lg
 (modified after loading)
TPH method for HP5890



=====

Injection Date	: 11/5/02 2:22:47 AM	Seq. Line	: 15
Sample Name	: 27689	Vial	: 15
Acq. Operator	: lg	Inj	: 1
		Inj Volume	: 1 µl

Acq. Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 10/18/02 5:21:11 PM by lg de
Analysis Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 11/5/02 9:55:48 AM by de lg
(modified after loading)
TPH method for HP5890



Date: 06 November 2002
Your ref: 10468
Our ref: 10468-020

ENSR Laboratory
Units 7&8
Sandpits Business Park
Mottram Road
Hyde
Cheshire
SK14 3AR
UKAS TESTING
Laboratory No. 1247

Test Report

Sample(s) of Soil from Tetrosyl, Walmersley.

Received from ENSR Land Assessment Department, Helsby.
237 Chester Road
Helsby
Cheshire
WA6 0AR

Date of receipt 31 October 2002
Date of analysis 31 October 2002

3 soil
TPH BTEX
2 soil
VOC
Last batch

Method Statement

TPH and BTEX analysis is performed in accordance with procedure A-T-007.

VOC analysis is performed in accordance with procedure A-T-006.



Louise Goddard

Analytical Chemist

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Tests marked "" in this report are not included in the UKAS Accreditation Schedule for the laboratory.

Analytical results reflect the quality of the sample at the time of analysis only.

ENSR Ref. No.	27671	27672	27673
Location	TP6	PH40	PH42
Depth (m)	1.0	1.0	1.7
TPH	22	<10	1,600
Comments	H/C Range C ₈ -C ₁₁	-	H/C Range C ₈ -C ₂₁
Total BTEX above reporting limits.	12.5	0	995
Benzene	<0.1	<0.1	<0.1
Toluene	5.6	<0.1	620
Ethylbenzene	1.1	<0.1	95
Xylene	5.8	<0.1	280

Table 1 – Soil TPH and BTEX Results (ppm)

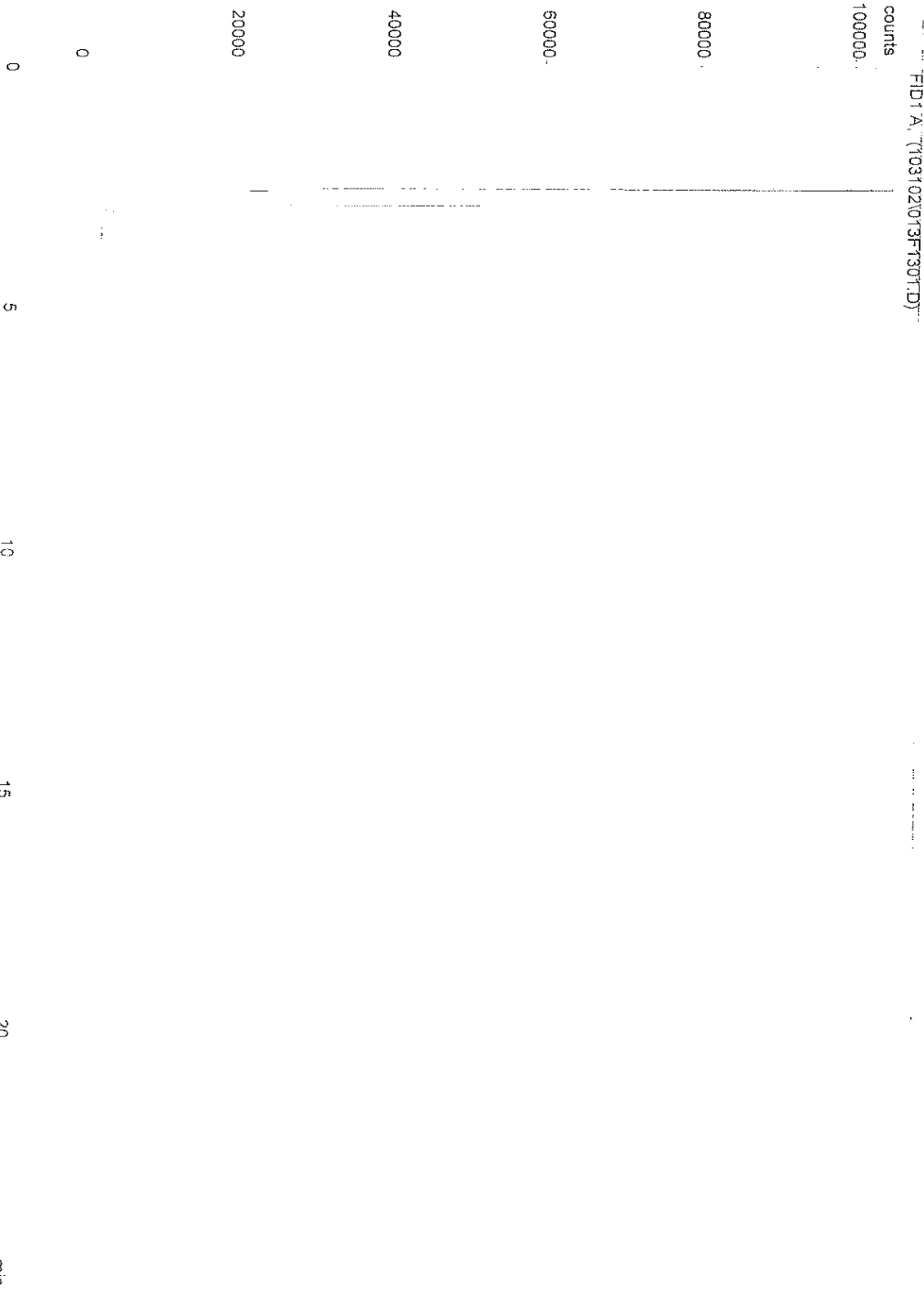
ENSR Ref. No.	27672	27673
Location	PH40	PH42
Depth (m)	1.0	1.7
Trichlorofluoromethane	<0.1	<1
1,1 Dichloroethene	<0.1	<1
Trans 1,2 Dichloroethene	<0.1	<1
1,1 Dichloroethane	<0.1	<1
Chloroform	<0.1	<1
1,1,1 Trichloroethane	<0.1	<1
1,2 Dichloroethane	<0.1	<1
Carbon Tetrachloride	<0.1	<1
1,2 Dichloropropane	<0.1	<1
Trichloroethene	<0.1	<1
Bromodichloromethane	<0.1	<1
cis 1,3 Dichloropropene	<0.1	<1
Trans 1,3 Dichloropropene	<0.1	<1
1,1,2 Trichloroethane	<0.1	<1
Dibromochloromethane	<0.1	<1
Tetrachloroethene	<0.1	<1
Chlorobenzene	<0.1	<1
Bromoform	<0.1	<1
1,1,2,2 Tetrachloroethane	<0.1	<1
1,2 Dichlorobenzene	<0.1	<1
1,4 Dichlorobenzene	<0.1	<1
1,3 Dichlorobenzene	<0.1	<1

Table 2 – Soil VOC Results (ppm)

=====

Injection Date	: 11/1/02 1:55:16 PM	Seq. Line	: 13
Sample Name	: 27671	Vial	: 13
Acq. Operator	: de lg	Inj	: 1
		Inj Volume	: 1 µl

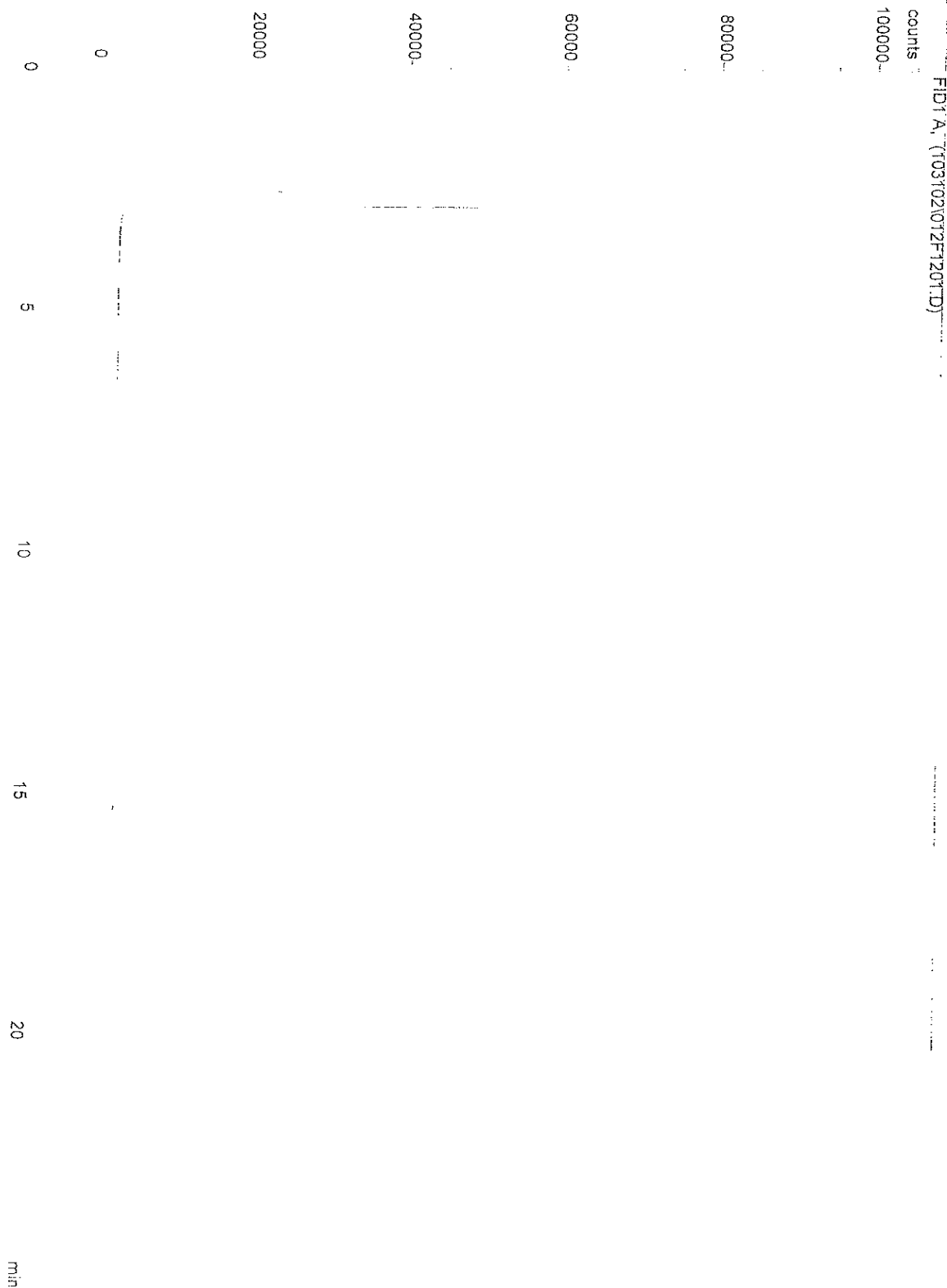
Acq. Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 10/18/02 5:21:11 PM by lg de
Analysis Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 11/5/02 9:50:05 AM by de lg
(modified after loading)
TPH method for HP5890



=====

Injection Date	: 11/1/02 1:17:34 PM	Seq. Line	: 12
Sample Name	: 27672	Vial	: 12
Acq. Operator	: de lg	Inj	: 1
		Inj Volume	: 1 µl
Acq. Method	: C:\HPCHEM\1\METHODS\WATER1.M		
Last changed	: 10/18/02 5:21:11 PM by lg de		
Analysis Method	: C:\HPCHEM\1\METHODS\WATER1.M		
Last changed	: 11/4/02 10:24:51 AM by de lg		
	(modified after loading)		

TPH method for HP5890



=====

Injection Date	: 11/1/02 3:47:26 PM	Seq. Line	: 16
Sample Name	: 27673	Vial	: 16
Acq. Operator	: de lg	Inj	: 1
		Inj Volume	: 1 µl

Acq. Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 10/18/02 5:21:11 PM by lg de
Analysis Method : C:\HPCHEM\1\METHODS\WATER1.M
Last changed : 11/4/02 10:24:51 AM by de lg
(modified after loading)
TPH method for HP5890



Date: 27 November 2002
Your ref: 10468
Our ref: 10468-011

ENSR Laboratory
Units 7&8
Sandpits Business Park
Mottram Road
Hyde
Cheshire
SK14 3AR
UKAS TESTING
Laboratory No. 1247

Test Report

Sample(s) of Soil from Tetrosyl, Walmersley.

Received from ENSR Land Assessment Department, Helsby.
237 Chester Road
Helsby
Cheshire
WA6 0AR

Date of receipt 29 October 2002
Date of analysis 30 October 2002

*Including
PCB and PAH
result.*

Method Statement

TPH and BTEX analysis is performed in accordance with procedure A-T-007.

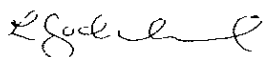
VOC analysis is performed in accordance with procedure A-T-006.

PCB analysis is performed in accordance with procedures A-T-004 and A-T-005.

* PAH analysis is performed in accordance with a documented in-house procedure.

* Subcontract analysis was sent to Geochem, Chester.

A copy of the report is attached.



Louise Goddard

Analytical Chemist

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Tests marked "" in this report are not included in the UKAS Accreditation Schedule for the laboratory.

Analytical results reflect the quality of the sample at the time of analysis only.

ENSR Ref. No.	27622	27623	27624	27626
Location	PH10	PH17	PH15	PH30 – D1
Depth (m)	0.6-0.7	2.4-2.6	0.2	0.3-0.5
TPH	>4,000	170	1,200	13
Comments	H/C Range C ₁₀ ->C ₃₆	H/C Range C ₈ -C ₁₁	H/C Range C ₁₀ -C ₂₃	H/C Range C ₈ -C ₁₀
Total BTEX above reporting limits.	2.5	4.2	1.4	3.5
Benzene	<0.1	<0.1	<0.1	<0.1
Toluene	0.5	0.8	0.4	1.0
Ethylbenzene	0.6	1.4	0.2	0.1
Xylene	1.4	2.0	0.8	2.4

Table 1 – Soil TPH and BTEX Results (ppm)

ENSR Ref. No.	27627	27628	27629	27630
Location	PH32 – D2	PH35 – D2	PH36 – D2	PH37 – D2
Depth (m)	1.6-1.8	1.8-1.9	3.7-3.8	1.7-1.9
TPH	<10	10	<10	38
Comments	-	H/C Range C ₉ -C ₁₁	-	H/C Range C ₇ -C ₁₀
Total BTEX above reporting limits.	0.1	0.4	0.6	24.5
Benzene	<0.1	<0.1	<0.1	0.1
Toluene	<0.1	<0.1	<0.1	7.9
Ethylbenzene	0.1	0.4	0.6	2.5
Xylene	<0.1	<0.1	<0.1	14

Table 2 – Soil TPH and BTEX Results (ppm)

ENSR Ref. No.	27634	27635	27636
Location	BH6 – D4	PH16	BH4
Depth (m)	1.5-1.95	0.4	3.0-3.1
TPH	<10	830	200
Comments	-	H/C Range C ₇ -C ₉ , C ₁₉ -C ₃₂	H/C Range C ₈ -C ₁₀
Total BTEX above reporting limits.	0	0.1	118.5
Benzene	<0.1	0.1	<0.1
Toluene	<0.1	<0.1	0.5
Ethylbenzene	<0.1	<0.1	26
Xylene	<0.1	<0.1	92

Table 3 – Soil TPH and BTEX Results (ppm)

ENSR Ref. No.	27631
Location	PH18
Depth (m)	1.6-1.8
TPH	<10
Comments	-

Table 4 – Soil TPH Results (ppm)

ENSR Ref. No.	# 27625	# 27626	27627	27628
Location	PH12	PH30 – D1	PH32 – D2	PH35 – D2
Depth (m)	0.5	0.3-0.5	1.6-1.8	1.8-1.9
Trichlorofluoromethane	<1	<1	<0.1	<0.1
1,1 Dichloroethene	<1	<1	<0.1	<0.1
Trans 1,2 Dichloroethene	<1	<1	<0.1	<0.1
1,1 Dichloroethane	<1	<1	<0.1	<0.1
Chloroform	<1	<1	<0.1	<0.1
1,1,1 Trichloroethane	<1	<1	<0.1	<0.1
1,2 Dichloroethane	<1	<1	<0.1	<0.1
Carbon Tetrachloride	<1	<1	<0.1	<0.1
1,2 Dichloropropane	<1	<1	<0.1	<0.1
Trichloroethene	<1	<1	<0.1	<0.1
Bromodichloromethane	<1	<1	<0.1	<0.1
cis 1,3 Dichloropropene	<1	<1	<0.1	<0.1
Trans1,3 Dichloropropene	<1	<1	<0.1	<0.1
1,1,2 Trichloroethane	<1	<1	<0.1	<0.1
Dibromochloromethane	<1	<1	<0.1	<0.1
Tetrachloroethene	<1	<1	<0.1	<0.1
Chlorobenzene	<1	<1	<0.1	<0.1
Bromoform	<1	<1	<0.1	<0.1
1,1,2,2 Tetrachloroethane	<1	<1	<0.1	<0.1
1,2 Dichlorobenzene	<1	<1	<0.1	<0.1
1,4 Dichlorobenzene	<1	<1	<0.1	<0.1
1,3 Dichlorobenzene	<1	<1	<0.1	<0.1

Table 5 – Soil VOC Results (ppm)

Increased reporting limits due to smaller sample size.

ENSR Ref. No.	27629	# 27630	27633	27634
Location	PH36 – D2	PH37 – D2	PH21	BH6 – D4
Depth (m)	3.7-3.8	1.7-1.9	1.0-1.1	1.5-1.95
Trichlorofluoromethane	<0.1	<1	<0.1	<0.1
1,1 Dichloroethene	<0.1	<1	<0.1	<0.1
Trans 1,2 Dichloroethene	<0.1	<1	<0.1	<0.1
1,1 Dichloroethane	<0.1	<1	<0.1	<0.1
Chloroform	<0.1	<1	<0.1	<0.1
1,1,1 Trichloroethane	<0.1	<1	<0.1	<0.1
1,2 Dichloroethane	<0.1	<1	<0.1	<0.1
Carbon Tetrachloride	<0.1	<1	<0.1	<0.1
1,2 Dichloropropane	<0.1	<1	<0.1	<0.1
Trichloroethene	<0.1	<1	<0.1	<0.1
Bromodichloromethane	<0.1	<1	<0.1	<0.1
cis 1,3 Dichloropropene	<0.1	<1	<0.1	<0.1
Trans 1,3 Dichloropropene	<0.1	<1	<0.1	<0.1
1,1,2 Trichloroethane	<0.1	<1	<0.1	<0.1
Dibromochloromethane	<0.1	<1	<0.1	<0.1
Tetrachloroethene	<0.1	<1	<0.1	<0.1
Chlorobenzene	<0.1	<1	<0.1	<0.1
Bromoform	<0.1	<1	<0.1	<0.1
1,1,2,2 Tetrachloroethane	<0.1	<1	<0.1	<0.1
1,2 Dichlorobenzene	<0.1	<1	<0.1	<0.1
1,4 Dichlorobenzene	<0.1	<1	<0.1	<0.1
1,3 Dichlorobenzene	<0.1	<1	<0.1	<0.1

Table 6 – Soil VOC Results (ppm)

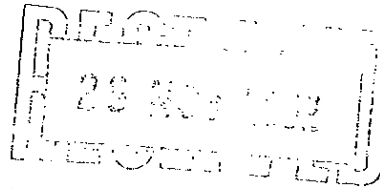
Increased reporting limits due to smaller sample size.

ENSR Ref. No.	27631
Location	PH18
Depth (m)	1.6-1.8
Naphthalene	<0.1
Acenaphthylene	<0.1
Acenaphthene	<0.1
Fluorene	<0.1
Phenanthrene	<0.1
Anthracene	<0.1
Fluoranthene	<0.1
Pyrene	<0.1
Benzo[a]anthracene	<0.1
Chrysene	<0.1
Benzo [b] fluoranthene	<0.1
Benzo [k] fluoranthene	<0.1
Benzo [a] pyrene	<0.1
Indeno (1,2,3 cd) pyrene	<0.1
Dibenzo [a,h] anthracene	<0.1
Benzo [g,h,i] perylene	<0.1
Total PAH above Limit of Detection	0

Table 7 – Soil PAH Results (ppm)

ENSR Ref. No.	27632
Your Ref. No.	PH5
Depth (m)	0.19-0.5
Total PCB reported as ppm Aroclor	<0.05

Table 8 – Soil PCB Results (Air Dried Sample)



CERTIFICATE OF ANALYSIS

Client: ENSR International
172 Chester Road
Helsby

WA6 OAR

Attention: Paul Walton

Date: 27 November, 2002

Our Reference: 02/11983/02/01

Your Reference: 10468

Location: Not Specified

A total of 3 samples was received for analysis on Wednesday, 6 November 2002. Accredited laboratory tests are defined in the log sheet, but opinions interpretations and on-site data expressed herein are outside the scope of UKAS accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Signed

Hazel Davidson
Operations Manager
Analytical Services

Compiled By

Janet Place

Page: 1 of 7



ALcontrol Geochem

JOB NUMBER : 02/11983/02

CLIENT : ENSR International

CONTACT : Paul Walton

DATE OF RECEIPT : 06/11/02

LOCATION : Not Specified

BATCH NUMBER: 1

CLIENT REF/CODE: 10468

ORDER NUMBER:

TURNAROUND : 8 days

Numeric values indicate additional scheduling

* indicates test subcontracted

[illegible]

123

☐ Preliminary
☒ Validated

Table Of Results

Job Number:

02/11983/02/01

Sample Type:

WATER

Client:

ENSR International

Location:

Not Specified

Date of Receipt:
(of first sample)

06/11/02

Client Contact:

Paul Walton

Client Ref. No.:

10468

Sample Number	Sample Identity	Depth (m)	UKAS Accredited																
			Units																
			Detection Method																
			Method Detection Limit																
1	BH 2 W3	UNKNOWN	<0.05	<0.05	<0.05	<0.1	<3	ppm SPECTRO	ppm spectro	ppb CVAAS	ppm GFAAS	ppm Grav	ppm HPLC	ppb ICP-USN	ppb ICP-USN	ppb ICP-USN	ppb ICP-USN	ppb ICP-USN	pH Value In Water
2	BH 5 W3	UNKNOWN	<0.05	<0.05	<0.05	<0.1	24	<0.05	<0.05	<0.05	<0.002	1	<0.01	<0.4	1	6	<10	<5	7.37
3	BH 9 W2	UNKNOWN	0.25	<0.05	<0.05	<0.1	509	<0.05	<0.05	<0.05	0.003	1	<0.01	<0.4	<1	7	<10	<5	8.33
																			7.96

Note: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

NFP = NO FIBRES PRESENT

Checked By

Janet Place

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM002	Determination of pH in soil using the HANNAH H1931402 Micro Processor pH meter	pH
TM004	Solvent extraction of soil	mg/kg
TM009	Class separation of hydrocarbons by thin layer chromatography (using Iatroscan)	mg/l mg/kg
TM015	Kone Analyser - Operator's Guide	N/A
TM021	The determination of total dissolved solids in waters.	mg/l
TM022	The determination of total suspended solids in waters	mg/l
TM023	The determination of pH in water samples using the 3040 ion analyser	pH
TM024	Determination of Exchangeable Ammonium in soil samples	mgNH ₄ /kg
TM027	Determination of phenol as C ₆ H ₅ OH using the Dr Lange photometer	mg/l mg/kg
TM028	Determination of chemical oxygen demand (COD) using the Hach COD reactor system	mgO /l
TM036	Determination of electrical conductivity using the Ciba Corning meter	mScm ⁻¹
TM043	Determination of alkalinity in aqueous samples	mg/l mg/kg
TM045	Determination of BOD ₅ (ATU) using the Ciba Corning Oxygen Meter	mg/l
TM049	Leco CS444 – Operator's Guide	N/A
TM050	Determination using the Leco CS444 Total Organic Carbon	%
TM053	Determination of Bulk Gas Composition (Suite 1)	% v/v
TM055	GC-MS Engine determination of polynuclear aromatic hydrocarbons in oil based mud by mass selective detection	µg/l mg/kg
TM057	Determination of saturates by gas chromatography	µg/l µg/kg mg/l mg/kg

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM059	Determination of whole oil by gas chromatography	N/A
TM060	Analysis of drilling cuttings	µg/l % wt
TM061	Determination of total petroleum hydrocarbons by gas chromatography	µg/l µg/kg mg/l mg/kg
TM062	Determination of phenols by HPLC	mg/l mg/kg
TM063	Analysis of BTEX hydrocarbons by GC-MSD/Tekmar	µg/l
TM064	Analysis of volatile hydrocarbons by GC-MS/Tekmar	µg/l
TM065	Preparation of Standard Solutions for Calibration Quality Control of Emission Spectrometers	N/A
TM066	Analysis of acid digested samples by Inductively Coupled Plasma - general operation	N/A
TM067	Total (Acid-Soluble) sulphate determination in soils using Leco CS444	%
TM068	Total sulphur determination using Leco CS444	%
TM070	Determination of total polychlorinated biphenyls (PCB's)	µg/l µg/kg mg/l mg/kg
TM071	Determination of acid /base neutrals by GCMS	µg/l mg/kg
TM072	Determination of phenols by GCMS	µg/l mg/kg
TM073	Determination of organochlorine and organophosphorous pesticides by GCMS	µg/l mg/kg
TM074	Determination of polynuclear aromatic hydrocarbons (PAH) by GC-MS	µg/l µg/kg mg/l mg/kg
TM078	Solid phase extraction of waters	mg/l
TM083	Determination of Sodium and Potassium by Flame Photometer	mg/l mg/kg
TM084	Analysis of aqueous samples for phenol -- using the Alliance distillation instrument	mg/l

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM087	Measurement of semi- and non-volatile petroleum hydrocarbons in soil or water samples by infra-red spectroscopy	mg/l mg/kg
TM089	Determination of Gasoline Range Organic Hydrocarbons (GRO) and BTEX(MTBE) compounds by Headspace GC-FID	µg/l µg/kg mg/l mg/kg
TM090	Determination of total organic carbon/total organic carbon in water and waste water	mgC/l
TM097	Determination of Chloride using the Kone Analyser	mg Cl /l mg Cl /kg
TM098	Determination of Sulphate using the Kone Analysers	mg SO ₄ ²⁻ /l
TM099	Determination of Ammonium in water samples and cation exchange capacity in soil samples using the Kone Analyser	mg NH ₄ -N/l
TM100	Determination of Phosphate using the Kone Analyser	mg PO ₄ /l
TM101	Determination of Sulphide in water samples using the Kone Analyser	mg S ²⁻ /l
TM102	Determination of Nitrate using the Kone Analyser	mg NO ₃ /l
TM103	Determination of Nitrite using the Kone Analyser	mg NO ₂ /l
TM104	Determination of Fluoride using the Kone Analyser	mg F /l
TM107	The determination of Chemical Oxygen Demand using the COD Dr Lange Kit	mg O /l
TM108	Determination of Thiocyanate by Colourmetric Spectroscopic Analysis	mg SCN /l mg SCN /kg
TM109	Total Carbon Determination using LECO CS444	%
TM112	Determination of S1 & S2 compounds by Pyrolysis -Gas Chromatography.	Area %
TM113	Determination of Total Cyanide by Steam Distillation	mg CN ⁻ /l mg CN ⁻ /kg
TM114	Determination of Aromatics by Gas Chromatography	N/A

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM120	Determination of Electrical Conductivity using the Jenway Conductivity Meter 4320	mScm ⁻¹
TM 123	The Determination of Total dissolved Solids in Water using the Jenway 4320 meter	mg/l
TM116	Preparation & Analysis of Volatile Hydrocarbons by Headspace GC-MSD/HP7694 Headspace Autosampler	µg/l µg/kg
TM 127	The determination of Trace Level Mercury in Aqueous Media and soil extracts by Atomic Absorption Spectroscopy	µg/l
TM 128	The determination of Ultra-Trace Level Arsenic and Selenium in aqueous Media and soil extracts by Hydride Generation Atomic Absorption Spectrophotometry	µg/l
TM 129	Determination of Metal Cations by IRIS Emmission Spectrometer	mg/l, mg/kg
TM131	USN Low-Level Metals	µg/l
TM 133	pH in Soil using the GLpH001 Meter	pH units
TM 134	Total Cyanide in Water by Steam Distillation	mg/l

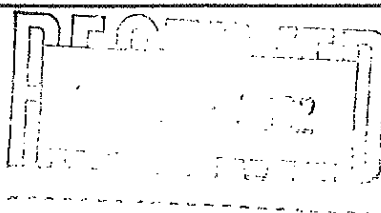
APPENDIX

1. Results are expressed as mg/Kg dry weight unless otherwise stated, excluding analyses in (2) below.
2. Leach tests, cyanide, phenols by MS, hexavalent chrome, flash point, acid soluble sulphides, TPH by IR and volatiles are performed on wet soil as received, and results are expressed as mg/Kg of wet soil or mg/l of leachate of specified leach test. Ammoniacal nitrogen and total phenols by HPLC are performed on wet sample but are then re-calculated and expressed as mg/kg of dry soil.
3. ICP metals results are analysed using a screening program and the data is accurate to within 20%.
4. The majority of analyses are run to an accuracy of 10%, but this may be improved upon if legally defensible data is required.
5. Every fifth sample is run in duplicate, but not reported, as part of our internal QC procedure.
6. A sub sample of all samples received will be retained free of charge for two months for soils and one month for waters (sample size permitting), but may then be discarded unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage.
7. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
8. Please note that we take no responsibility for any test performed by sub-contractors (marked with an asterisk).
9. Asbestos screen is done in-house on soils and if no fibres are found will be reported as NFP-no fibres present. If asbestos is detected then identification & quantification is carried out by a sub-contractor. If a sample is suspected of containing asbestos then drying & crushing will be suspended on that sample until the asbestos result is known. If asbestos is present then no analysis requiring dry sample will be undertaken.
10. NDP-No determination possible due to insufficient/unsuitable sample.



CERTIFICATE OF ANALYSIS

Client: RSK ENSR
237 Chester Road
Helsby
Cheshire



WA6 0AD

Attention: Paula Marshall

Date: 25 November, 2002

Our Reference: 02/11893/02/01

Your Reference: 10468

Location: Walmersley

Full report
for
TP1-7
PM 38.40

A total of 7 samples was received for analysis on Monday, 4 November 2002. Accredited laboratory tests are defined in the log sheet, but opinions interpretations and on-site data expressed herein are outside the scope of UKAS accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Signed

Hazel Davidson
Operations Manager
Analytical Services

Compiled By

Janet Place

**GEOCHEM
11893
TP1-7 + PM
SOLS ICRL**



ALcontrol Geochem TEST SCHEDULE

JOB NUMBER : 02/11893/02
 CLIENT : RSK ENSR
 CONTACT : Paula Marshall
 DATE OF RECEIPT : 04/11/02
 LOCATION : Walmersley

BATCH NUMBER : 1
 CLIENT REF/CODE : 10468
 ORDER NUMBER :
 TURNAROUND : 8 days

Numeric values indicate
 additional scheduling

* indicates test subcontracted

Sample Number	Sample Identity	P / V	Depth	Sample Type	UKAS Accredited ?	ICP ICRCL (9)	B (H2O Sol)	pH (soil)	Tot. SO4 by ICP	Phenol prep	Tot Phen HPLC	Ac.Sol.Sulphide	Total cyanide	Solv. Ext. Matter	Soluble SO4	Free CN Soil
1	TP1	500g	0.60	SOIL	✓	X	X	X	X	X	X	X	X	X		
2	TP3	500g	0.60	SOIL	✓	X	X	X	X	X	X	X	X	X		
3	TP5	BAG	1.00	SOIL	✓	X	X	X	X	X	X	X	X	X		
4	TP6	500g	0.60	SOIL	✓	X	X	X	X	X	X	X	2	X	2	2
5	TP7	BAG	0.60	SOIL	✓	X	X	X	X	X	X	X	X	X		
6	PH38	500g	0.40	SOIL	✓	X	X	X	X	X	X	X	X	X		
7	PH41	500g	0.80-0.90	SOIL	✓	X	X	X	X	X	X	X	X	X		
Total Number of Tests						7	7	7	7	7	7	7	7	7	1	1

Validated

Table Of Results

Walmersley

Client Ref No:

[illegible]

NDP = NO DETERMINATION POSSIBLE

Janet Place

✓	Validated
---	-----------

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM002	Determination of pH in soil using the HANNAH H1931402 Micro Processor pH meter	pH
TM004	Solvent extraction of soil	mg/kg
TM009	Class separation of hydrocarbons by thin layer chromatography (using Iatroscan)	mg/l mg/kg
TM015	Kone Analyser - Operator's Guide	N/A
TM021	The determination of total dissolved solids in waters.	mg/l
TM022	The determination of total suspended solids in waters	mg/l
TM023	The determination of pH in water samples using the 3040 ion analyser	pH
TM024	Determination of Exchangeable Ammonium in soil samples	mgNH ₄ /kg
TM027	Determination of phenol as C ₆ H ₅ OH using the Dr Lange photometer	mg/l mg/kg
TM028	Determination of chemical oxygen demand (COD) using the Hach COD reactor system	mgO /l
TM036	Determination of electrical conductivity using the Ciba Corning meter	mScm ⁻¹
TM043	Determination of alkalinity in aqueous samples	mg/l mg/kg
TM045	Determination of BOD ₅ (ATU) using the Ciba Corning Oxygen Meter	mg/l
TM049	Leco CS444 – Operator's Guide	N/A
TM050	Determination using the Leco CS444 Total Organic Carbon	%
TM053	Determination of Bulk Gas Composition (Suite 1)	% v/v
TM055	GC-MS Engine determination of polynuclear aromatic hydrocarbons in oil based mud by mass selective detection	µg/l mg/kg
TM057	Determination of saturates by gas chromatography	µg/l µg/kg mg/l mg/kg

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM059	Determination of whole oil by gas chromatography	N/A
TM060	Analysis of drilling cuttings	µg/l % wt
TM061	Determination of total petroleum hydrocarbons by gas chromatography	µg/l µg/kg mg/l mg/kg
TM062	Determination of phenols by HPLC	mg/l mg/kg
TM063	Analysis of BTEX hydrocarbons by GC-MSD/Tekmar	µg/l
TM064	Analysis of volatile hydrocarbons by GC-MS/Tekmar	µg/l
TM065	Preparation of Standard Solutions for Calibration Quality Control of Emission Spectrometers	N/A
TM066	Analysis of acid digested samples by Inductively Coupled Plasma - general operation	N/A
TM067	Total (Acid-Soluble) sulphate determination in soils using Leco CS444	%
TM068	Total sulphur determination using Leco CS444	%
TM070	Determination of total polychlorinated biphenyls (PCB's)	µg/l µg/kg mg/l mg/kg
TM071	Determination of acid /base neutrals by GCMS	µg/l mg/kg
TM072	Determination of phenols by GCMS	µg/l mg/kg
TM073	Determination of organochlorine and organophosphorous pesticides by GCMS	µg/l mg/kg
TM074	Determination of polynuclear aromatic hydrocarbons (PAH) by GC-MS	µg/l µg/kg mg/l mg/kg
TM078	Solid phase extraction of waters	mg/l
TM083	Determination of Sodium and Potassium by Flame Photometer	mg/l mg/kg
TM084	Analysis of aqueous samples for phenol – using the Alliance distillation instrument	mg/l

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM087	Measurement of semi- and non-volatile petroleum hydrocarbons in soil or water samples by infra-red spectroscopy	mg/l mg/kg
TM089	Determination of Gasoline Range Organic Hydrocarbons (GRO) and BTEX(MTBE) compounds by Headspace GC-FID	µg/l µg/kg mg/l mg/kg
TM090	Determination of total organic carbon/total organic carbon in water and waste water	mgC/l
TM097	Determination of Chloride using the Kone Analyser	mg Cl /l mg Cl /kg
TM098	Determination of Sulphate using the Kone Analysers	mg SO ₄ ²⁻ /l
TM099	Determination of Ammonium in water samples and cation exchange capacity in soil samples using the Kone Analyser	mg NH ₄ -N/l
TM100	Determination of Phosphate using the Kone Analyser	mg PO ₄ /l
TM101	Determination of Sulphide in water samples using the Kone Analyser	mg S ²⁻ /l
TM102	Determination of Nitrate using the Kone Analyser	mg NO ₃ /l
TM103	Determination of Nitrite using the Kone Analyser	mg NO ₂ /l
TM104	Determination of Fluoride using the Kone Analyser	mg F /l
TM107	The determination of Chemical Oxygen Demand using the COD Dr Lange Kit	mg O /l
TM108	Determination of Thiocyanate by Colourmetric Spectroscopic Analysis	mg SCN /l mg SCN /kg
TM109	Total Carbon Determination using LECO CS444	%
TM112	Determination of S1 & S2 compounds by Pyrolysis -Gas Chromatography.	Area %
TM113	Determination of Total Cyanide by Steam Distillation	mg CN ⁻ /l mg CN ⁻ /kg
TM114	Determination of Aromatics by Gas Chromatography	N/A

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM120	Determination of Electrical Conductivity using the Jenway Conductivity Meter 4320	mScm ⁻¹
TM 123	The Determination of Total dissolved Solids in Water using the Jenway 4320 meter	mg/l
TM116	Preparation & Analysis of Volatile Hydrocarbons by Headspace GC-MSD/HP7694 Headspace Autosampler	µg/l µg/kg
TM 127	The determination of Trace Level Mercury in Aqueous Media and soil extracts by Atomic Absorption Spectroscopy	µg/l
TM 128	The determination of Ultra-Trace Level Arsenic and Selenium in aqueous Media and soil extracts by Hydride Generation Atomic Absorption Spectrophotometry	µg/l
TM 129	Determination of Metal Cations by IRIS Emmission Spectrometer	mg/l, mg/kg
TM131	USN Low-Level Metals	µg/l
TM 133	pH in Soil using the GLpH001 Meter	pH units
TM 134	Total Cyanide in Water by Steam Distillation	mg/l

APPENDIX

1. Results are expressed as mg/Kg dry weight unless otherwise stated, excluding analyses in (2) below.
2. Leach tests, cyanide, phenols by MS, hexavalent chrome, flash point, acid soluble sulphides, TPH by IR and volatiles are performed on wet soil as received, and results are expressed as mg/Kg of wet soil or mg/l of leachate of specified leach test. Ammoniacal nitrogen and total phenols by HPLC are performed on wet sample but are then re-calculated and expressed as mg/kg of dry soil.
3. ICP metals results are analysed using a screening program and the data is accurate to within 20%.
4. The majority of analyses are run to an accuracy of 10%, but this may be improved upon if legally defensible data is required.
5. Every fifth sample is run in duplicate, but not reported, as part of our internal QC procedure.
6. A sub sample of all samples received will be retained free of charge for two months for soils and one month for waters (sample size permitting), but may then be discarded unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage.
7. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
8. Please note that we take no responsibility for any test performed by sub-contractors (marked with an asterisk).
9. Asbestos screen is done in-house on soils and if no fibres are found will be reported as NFP-no fibres present. If asbestos is detected then identification & quantification is carried out by a sub-contractor. If a sample is suspected of containing asbestos then drying & crushing will be suspended on that sample until the asbestos result is known. If asbestos is present then no analysis requiring dry sample will be undertaken.
10. NDP-No determination possible due to insufficient/unsuitable sample.

**ALcontrol Geochem**

Chester Street,
Chester CH4 8RD
tel: (01244) 671121
fax: (01244) 683306
email: mkt@alcontrol.co.uk

CERTIFICATE OF ANALYSIS

Client: Envirolab
Sandpits Business Park
Mottram Road
Hyde

16 DEC 2002

SK14 6AR

Attention: Louise Goddard

Date: 13 December, 2002

Our Reference: 02/11776/02/02

Your Reference: 10468-157

Location: Not Specified

A total of 17 samples was received for analysis on Thursday, 31 October 2002. Accredited laboratory tests are defined in the log sheet, but opinions interpretations and on-site data expressed herein are outside the scope of UKAS accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Signed

Hazel Davidson
Operations Manager
Analytical Services

Compiled By

Janet Place

Page: 1 of 10



1291

TEST SCHEDULE

TURNAROUND : 8 days

* indicates test subcontracted

Page 2 of 10

Name: Paul Boden

Printed: 11/12/02 15:00:10

Page 3 of 10

Table Of Results

[illegible]

Table Of Results

☒ Preliminary

☒ Validated

Job Number: 02/11776/02/02

Client: EnviroLab

Date of Receipt: 31/10/02
(of first sample)

Sample Type: SOIL

Location: Not Specified

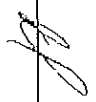
Client Contact: Louise Goddard

Client Ref. No.: 10468-157

Sample Number	Sample Identity	Depth (m)	UKAS Accredited							
			Units							
			Detection Method							
			Method Detection Limit							
			✓	✓	ppm	ppm	Ion Chr			
			Spectro1	Spectro2	<2.5	<2.5	<1			
			Water Soluble Sulphate as SO4				Total Cyanide			
			Free Cyanide Soil Low							
1	27637 PH1	0.15-0.25		24.9						
2	27638 PH6	1.60-1.70		<2.5						
3	27639 PH7	1.00-2.00		<2.5						
4	27640 PH9	1.40-1.50		<2.5						
5	27641 PH9	0.80-0.90	0.399	4.3						
6	27642 PH10	1.10-1.80		<2.5						
7	27643 PH11	0.80-0.90		<2.5						
8	27644 PH12	1.50		<2.5						
9	27645 PH14	0.30	0.942	436.9			<1			
10	27646 PH17	0.80-1.00		<2.5						
11	27647 PH21	0.50-0.60	0.930	<2.5						
12	27648 PH22	1.70		<2.5						
13	27649 PH23	1.20		<2.5						
14	27650 PH24	1.00		4.99						
15	27651 PH25	1.50-1.60		<2.5						
16	27652 PH28-D2	1.30-1.50	0.062	<2.5						
17	27653 PH36-D2	3.70-3.80		<2.5						

NDP = NO DETERMINATION POSSIBLE
NFP = NO FIBRES PRESENT

Note: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

Checked By  Janet Place

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM002	Determination of pH in soil using the HANNAH HI931402 Micro Processor pH meter	pH
TM004	Solvent extraction of soil	mg/kg
TM009	Class separation of hydrocarbons by thin layer chromatography (using Iatroscan)	mg/l mg/kg
TM015	Kone Analyser - Operator's Guide	N/A
TM021	The determination of total dissolved solids in waters.	mg/l
TM022	The determination of total suspended solids in waters	mg/l
TM023	The determination of pH in water samples using the 3040 ion analyser	pH
TM024	Determination of Exchangeable Ammonium in soil samples	mgNH ₄ /kg
TM027	Determination of phenol as C ₆ H ₅ OH using the Dr Lange photometer	mg/l mg/kg
TM028	Determination of chemical oxygen demand (COD) using the Hach COD reactor system	mgO /l
TM036	Determination of electrical conductivity using the Ciba Corning meter	mScm ⁻¹
TM043	Determination of alkalinity in aqueous samples	mg/l mg/kg
TM045	Determination of BOD ₅ (ATU) using the Ciba Corning Oxygen Meter	mg/l
TM049	Leco CS444 – Operator's Guide	N/A
TM050	Determination using the Leco CS444 Total Organic Carbon	%
TM053	Determination of Bulk Gas Composition (Suite 1)	% v/v
TM055	GC-MS Engine determination of polynuclear aromatic hydrocarbons in oil based mud by mass selective detection	µg/l mg/kg
TM057	Determination of saturates by gas chromatography	µg/l µg/kg mg/l mg/kg

Issue Date:21/06/02

Page 2 of 4

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM059	Determination of whole oil by gas chromatography	N/A
TM060	Analysis of drilling cuttings	µg/l % wt
TM061	Determination of total petroleum hydrocarbons by gas chromatography	µg/l µg/kg mg/l mg/kg
TM062	Determination of phenols by HPLC	mg/l mg/kg
TM063	Analysis of BTEX hydrocarbons by GC-MSD/Tekmar	µg/l
TM064	Analysis of volatile hydrocarbons by GC-MS/Tekmar	µg/l
TM065	Preparation of Standard Solutions for Calibration Quality Control of Emission Spectrometers	N/A
TM066	Analysis of acid digested samples by Inductively Coupled Plasma - general operation	N/A
TM067	Total (Acid-Soluble) sulphate determination in soils using Leco CS444	%
TM068	Total sulphur determination using Leco CS444	%
TM070	Determination of total polychlorinated biphenyls (PCB's)	µg/l µg/kg mg/l mg/kg
TM071	Determination of acid /base neutrals by GCMS	µg/l mg/kg
TM072	Determination of phenols by GCMS	µg/l mg/kg
TM073	Determination of organochlorine and organophosphorous pesticides by GCMS	µg/l mg/kg
TM074	Determination of polynuclear aromatic hydrocarbons (PAH) by GC-MS	µg/l µg/kg mg/l mg/kg
TM078	Solid phase extraction of waters	mg/l
TM083	Determination of Sodium and Potassium by Flame Photometer	mg/l mg/kg
TM084	Analysis of aqueous samples for phenol - using the Alliance distillation instrument	mg/l

Issue Date:21/06/02

Page 3 of 4

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM087	Measurement of semi- and non-volatile petroleum hydrocarbons in soil or water samples by infra-red spectroscopy	mg/l mg/kg
TM089	Determination of Gasoline Range Organic Hydrocarbons (GRO) and BTEX(MTBE) compounds by Headspace GC-FID	µg/l µg/kg mg/l mg/kg
TM090	Determination of total organic carbon/total organic carbon in water and waste water	mgC/l
TM097	Determination of Chloride using the Kone Analyser	mg Cl /l mg Cl /kg
TM098	Determination of Sulphate using the Kone Analysers	mg SO ₄ ²⁻ /l
TM099	Determination of Ammonium in water samples and cation exchange capacity in soil samples using the Kone Analyser	mg NH ₄ -N/l
TM100	Determination of Phosphate using the Kone Analyser	mg PO ₄ /l
TM101	Determination of Sulphide in water samples using the Kone Analyser	mg S ²⁻ /l
TM102	Determination of Nitrate using the Kone Analyser	mg NO ₃ /l
TM103	Determination of Nitrite using the Kone Analyser	mg NO ₂ /l
TM104	Determination of Fluoride using the Kone Analyser	mg F /l
TM107	The determination of Chemical Oxygen Demand using the COD Dr Lange Kit	mg O /l
TM108	Determination of Thiocyanate by Colourmetric Spectroscopic Analysis	mg SCN /l mg SCN /kg
TM109	Total Carbon Determination using LECO CS444	%
TM112	Determination of S1 & S2 compounds by Pyrolysis -Gas Chromatography.	Area %
TM113	Determination of Total Cyanide by Steam Distillation	mg CN ⁻ /l mg CN ⁻ /kg
TM114	Determination of Aromatics by Gas Chromatography	N/A

Issue Date 21/06/02

UKAS ACCREDITED TEST METHODS

METHOD No	METHOD TITLE	UNITS
TM120	Determination of Electrical Conductivity using the Jenway Conductivity Meter 4320	mScm ⁻¹
TM 123	The Determination of Total dissolved Solids in Water using the Jenway 4320 meter	mg/l
TM116	Preparation & Analysis of Volatile Hydrocarbons by Headspace GC-MSD/HP7694 Headspace Autosampler	µg/l µg/kg
TM 127	The determination of Trace Level Mercury in Aqueous Media and soil extracts by Atomic Absorption Spectroscopy	µg/l
TM 128	The determination of Ultra-Trace Level Arsenic and Selenium in aqueous Media and soil extracts by Hydride Generation Atomic Absorption Spectrophotometry	µg/l
TM 129	Determination of Metal Cations by IRIS Emmission Spectrometer	mg/l, mg/kg
TM131	USN Low-Level Metals	µg/l
TM 133	pH in Soil using the GLpH001 Meter	pH units
TM 134	Total Cyanide in Water by Steam Distillation	mg/l