Wardell Armstrong
Engineering & Environmental Solutions

Bill Howarth Metals Limited

Jersey Street Site, Ancoats
Manchester

Desk Study and Contamination Investigation Report

July 2002

Wardell Armstrong
Engineering & Environmental Solutions

Bill Howarth Metals Limited

Jersey Street Site, Ancoats
Manchester

Desk Study and Contamination Investigation Report

July 2002

Wardell Armstrong

Wardell Armstrong
Engineering & Environmental Solutions

DATE ISSUED: 11th July 2002
JOB NUMBER: LE02660
REPORT NUMBER: 001

BILL HOWARTH METALS LIMITED

JERSEY STREET, ANCOATS.
DESK STUDY AND CONTAMINATION INVESTIGATION REPORT

PREPARED BY:

PP Nicholas Clarke Environmental Scientist

APPROVED BY:

C. Mark Dawson Partner

This report has been prepared by Wardell Armstrong with all reasonable skill, care and diligence, within the terms of the Contract with the Client. The report is confidential to the Client and Wardell Armstrong accept no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced without the prior written approval of Wardell Armstrong.

2 The Avenue, Leigh, Lancashire WN7 1ES U.K.
Tel: +44 (0)1942 260101 Fax: +44 (0)1942 261754 www.wardell-armstrong.com

Wardell Armstrong is a Partnership and a list of the Partners and their professional qualifications is open to inspection at our offices.
Wardell Armstrong is a member of the Wardell Armstrong Consulting Group which comprises
Wardell Armstrong, Wardell Armstrong China Limited, Wardell Armstrong Laird Menzies Limited, CSMA Consultants Limited.
Head Office: Newcastle-under-Lyme. Other Offices: Camborne, Cardiff, Edinburgh, Leigh, London, Newcastle upon Tyne, Sheffield, West Bromwich.

CONTENTS

1. INTRODUCTION 1

1.1 INSTRUCTIONS 1
1.2 SITE LOCATION 1
1.3 PURPOSE AND BASIS OF REPORT 1

2. SITE HISTORY AND PRESENT LAND USE 2

2.1 DATA SOURCES 2
2.2 SITE HISTORY 2

3. ENVIRONMENTAL SETTING AND CONSULTATIONS 4

3.1 STATUTORY SOURCES 4
3.2 WASTE MANAGEMENT SITES 4
3.2.1 Landfill Sites *4*
3.3 POLLUTION INCIDENTS 5
3.4 DISCHARGE CONSENTS TO CONTROLLED WATERS 5
3.5 GROUNDWATER ABSTRACTIONS 5
3.6 AIR POLLUTION CONTROL & INTEGRATED POLLUTION PREVENTION & CONTROL 6
3.7 RADIOACTIVE SUBSTANCES AUTHORISATIONS (RSA'S) 6
3.8 RADON 6
3.9 CONTEMPORARY TRADE DIRECTORY ENTRIES (OF POSSIBLE CONTAMINATIVE USE) AND FUEL STATION ENTRIES 7

4. SITE WALKOVER 8

4.1 SITE AND PROCESS DESCRIPTION 8
4.1.1 Warehouse and sorting area. *8*
4.1.2 The Yard Area *8*
4.1.3 Offices & Maintenance Buildings *9*
4.1.4 General Process Operation *9*

5. GEOLOGICAL AND MINING POSITION 10

5.1 SUPERFICIAL STRATA 10
5.2 SOLID STRATA 10
5.3 MINING 10
5.4 HYDROGEOLOGY 10

6. INTRUSIVE SITE INVESTIGATION 11

6.1 INTRODUCTION 11
6.2 SAMPLING METHODOLOGY 11
6.2.1 Sample Collection *11*
6.3 CONTAMINATION RESULTS 11
6.3.1 Testing methodology *11*
6.4 SUMMARY OF RESULTS 12
6.4.1 Location WS1 ..... *12*

6.4.2 Location WS2 ..... *14*
6.4.3 Location WS3 ..... *15*
6.4.4 Location WS4 ..... *15*
6.4.5 Location WS5 ..... *15*
6.4.6 Location WS6 ..... *16*
6.4.7 Location WS7 ..... *16*
6.4.8 Aluminium *16*
6.5 DISCUSSION OF RESULTS 16
7. CONCLUSIONS AND RECOMMENDATIONS 18
7.1 CONCLUSIONS 18
7.2 RECOMMENDATIONS 18

APPENDICES

Appendix A Borehole Logs
Appendix B Laboratory Results

DRAWINGS

Drawing Number	Title	Scale
LE02660/01	Site Location	NTS
LE02660/02	Site Layout	NTS
LE02660/03	Sample Locations	NTS

1. INTRODUCTION

1.1 Instructions

This report is prepared in accordance with instructions dated 1 May 2002 from Wake Dyne Lawton solicitors on behalf of their clients Bill Howarth Metals Limited; This follows a proposal dated 17 April 2002 by Wardell Armstrong.

1.2 Site Location

The site is located at 109 Jersey Street in the Ancoats area of Manchester, approximately one mile to the north of the city centre as shown on Drawing No. LE02660/001. The site is an operational foundry that smelts aluminium scrap which is sold on as ingots. The site comprises a yard area, office accommodation a maintenance garage and a large 'warehouse' type building which houses the main process, which includes three furnaces, an ingot caster, a scrap metal compressor / baler as well as a storage area. This layout is shown on drawing number LE02660/002.

1.3 Purpose and Basis of Report

Bill Howarth metals are considering relocating their business, and require an investigation to identify any land contamination at their current site in order that the contamination status may be established before sale. The assessment has been undertaken by conducting a desktop study, a site walkover to assess general housekeeping and process management and an intrusive site investigation including the taking of soil samples for laboratory testing.

2. SITE HISTORY AND PRESENT LAND USE

2.1 Data Sources

The history of the site and its immediate vicinity has been researched by reference to topographical and environmental data primarily based on a Landmark EnviroCheck report dated 7 May 2002

2.2 Site History

The site history has been researched to identify previous land uses, including any significant potentially contaminative uses. Where other features that may have an effect on development of the site have been identified they are detailed.

Table I summarises the history of the site and its immediate vicinity over the period from about 1848 to the present day.

TABLE I
SUMMARY OF LAND USE

Date (approx.) *	Site Land Use	Adjacent Land Use
1848	The site appears to be developed, however the clarity of the plan does not allow a proper assessment of this development to be made.	The site is located in an area of Manchester to the north of the city centre. At this time the Ancoats area is an urban fringe area and the now heavily developed Miles Platting suburb located approximately 1km to the north of the site is a village area. To the south of the site, the city of Manchester is well developed particularly from an industrial perspective. .
1893	The site is shown to comprise a number of 'warehouse' buildings and is identified as an iron works. A branch of the Rochdale Canal is located along the northern boundary of the site. The canal branch enters the site under Poland Street at the eastern site boundary; the entire width of the canal is within the boundary of the site, it leaves the site on its the western boundary	The site is in an industrialised area, which is bounded by high density terraced housing. The Rochdale Canal runs in an east-west direction approximately 100m south of the site. The canal has a number of 'branches' that serve industrial premises via a series of canal wharfs. The branch that serves the subject site runs E - W from a branch runs south to north from the main canal. A number of works are located alongside this north south branch. One such wharf is located immediately adjacent and to the north of the subject site. To the south of Jersey Street (across the road) from the subject site is the Flint Glass works; 4 other mills are on the southern side of Jersey St. On the southern side of the canal are other works including a steel mill. The Oldham Road goods station lies approximately 250-300m north of the site.

TABLE I SUMMARY OF LAND USE		
Date (approx.)	**Site Land Use**	**Adjacent Land Use**
1908	The canal branch on the site is now called the 'Bengal Arm'. The buildings Adjacent to the west of the iron works are shown to be a glass works.	The N-S branch of the canal east of the site is called the Prussia Street Branch. A corn store located on the western side of the Prussia St. branch approximately 50m from the subject site has been converted into a glass works. The wharf immediately to the north of the site has been in-filled and an iron works has been built in its place. A wharf 50m to the east of the site has been infilled and is now a yard. There are unmarked buildings between the yard and the 'new' glass works.
1922	No significant change from previous period.	The buildings between the glassworks and the yard, approximately 20m NE of the subject site are shown to be a print works. The flint glass works south of the site has closed, in its place is a waterproof factory. A flour mill now occupies the warehouse 20m to the west of the site
1951	The buildings on site have been renovated and are shown to be the Phoenix Iron works. It appears that the canal branch on the site has been in-filled and covered over.	The corn mill to the west of the site has become a soap works. The iron works immediately to the north of the site is an engineering works. In the streets approximately 100m to the north of the site is a depository and a paint works. To the south of the site, the waterproof works is now a clothing factory and beyond that is a waste paper factory. Other industry along the Rochdale canal includes a Dye Works 250m east of the site and other miscellaneous mills and works closer to the site.
1965	No significant change from the previous period.	The Bengal and the Prussia branches of the canal appear to have been infilled; the various works along the Prussia Branch remain.
1969		The print works 20m NE of the site are shown to be a textile printing works and the site has clothing factories to the east south and west, Engineering works still remain immediately to the north and south east of the site. A number of clothes factories and mills are located within 250m of the south of the site.
1988	The site is shown to be as it is today	The textile printing works have been demolished and many of the factories are now shown to be warehousing. The area of industry south of the Rochdale Canal has been demolished and new housing estates have been constructed in its place.

3. ENVIRONMENTAL SETTING AND CONSULTATIONS

3.1 Statutory Sources

The table below summarises the land uses, which are located within a 1000m radius of the site centre; these land uses are based on information held by statutory agencies and from trade directories. The table is based on information supplied by the Landmark EnviroCheck report. The environmental setting of the site helps to determine the likelihood of ground contamination at the site emanating from other sources.

TABLE II (based on information provided by Landmark)

Data Type	50m	250m	500m	1000m
Air Pollution Controls	1		1	12
Integrated Pollution Controls				
Discharge consents to controlled waters			5	36
Pollution Incidents to controlled waters		3	5	13
Prosecutions to controlled waters				
Red List Discharge consents				
Radio Active Substance Authorisations			1	5
Water Abstractions				2
BGS landfill Sites				
Integrated Pollution Control waste sites				
Licensed waste management facilities				
Registered landfill sites			1	
Registered waste transfer sites				6
Registered Waste Treatment or Disposal sites				1
COMAH Sites				
Explosive sites				
Trade directory entries of potential contaminative use	6	14	26	156
Fuel station entries			1	3

3.2 Waste Management Sites

3.2.1 Landfill Sites

Landfill sites have the potential to pollute groundwater. Landfilled waste (particularly biodegradable wastes) can produce a potentially polluting leachate and, depending on the type of waste, carbon dioxide and methane gas can be produced.

Without carrying out full quantitative risk assessment on a landfill site it is difficult to determine the level of any risk that landfills may pose; however in broad terms the zone of influence is considered to be approximately 250m from the landfill.

Information from the Environment Agency via Landmark has identified one registered landfill site, approximately 570 metres from the subject site. The landfill is licensed to

accept less than 10,000 tonnes of waste per year and the licensed categories of waste include scrap electrical wastes, scrap vehicles and uncontaminated transformers and capacitors. The site is prohibited from accepting any wastes not listed in the licence, including special wastes.

Before 1976 there was no requirement to license waste disposal activities and therefore there may be unrecorded tips which could possibly present contamination risks dependent on the fill material. The possibility of further unrecorded landfilling activities within influencing distance of the site cannot be discounted. If, at some time in the future, the presence of such an unrecorded landfill is revealed then its potential influence on the site may need to be investigated and dealt with as necessary. This is particularly relevant in respect of the noted canal filling activities across the north of the site and to the east of the site during the middle of last century as indicated in Table One above.

3.3 Pollution Incidents

Information from the Environment Agency via Landmark has identified that there have been eight pollution incidents to controlled surface waters; all of these incidents were classified as minor incidents at the time of their occurrence. Three incidents took place between 50 and 500m from the site and five incidents took place over 500m from the site. Therefore, the likelihood of any contamination from the incidents affecting the site is negligible. Significant risk from these sources can be sensibly discounted.

3.4 Discharge Consents to Controlled Waters

Information from the Environment Agency via Landmark has identified that there are five discharges to controlled waters in the vicinity of the site, however these are all between 250m and 500m from the site boundary. Two of these consents have been revoked, the remaining three consents are current and are held by United Utilities for storm overflow discharge into the River Medlock. The presence of these measures is unlikely to cause a significant risk to these sites.

3.5 Groundwater abstractions

There are two groundwater abstractions within 1km of the site. Both of these abstraction points are for industrial uses, any contamination of groundwater beneath the subject site may or may not have a significant impact depending on what these uses are. There are further sensitive users, also with water abstraction licences, less than 1500m from the site. In either case any pollution of groundwater beneath the site would be in breach of the Water Resources Act 1991

3.6 Air pollution Control & Integrated Pollution Prevention & Control

The permitting of air releases relates primarily to those sites that hold authorisations to operate issued under the Environmental Protection Act 1990 Part 1 (issued prior to the Pollution Prevention and Control Act 1999). The 1990 Act sets out two pollution control schemes, Integrated Pollution Control (IPC, also known as Part A processes) and Local Air Pollution Control (LAPC, also known as Part B processes). IPC covers emissions to all media, while LAPC is concerned with emissions only to air. Operations requiring these permits are generally considered the more polluting industrial processes that pose a greater risk of environmental damage to all media.

Bill Howarth Metals Limitedhold a permit for the operation of furnaces for the extraction of non-ferrous metal from scrap. In addition, information from the Local Authority via Landmark identifies one Local Authority Air Pollution Control authorisation for the operation of a Printworks approximately 380m west of the subject site. This permit has now been revoked. There are a further twelve authorised processes between 500m and 1km.

3.7 Radioactive Substances Authorisations (RSA's)

Information from the Environment Agency via Landmark shows there are six authorisations for registered radioactive substances under S7 of the Radioactive Substances Act (RSA) for the keeping and use of radioactive materials. One of these authorisations is approximately 360m from the site and was formally held by the Greater Manchester Fire Service, the authorisation is noted as being cancelled or revoked.
A further 12 authorisations are listed to companies between 500m & 1Km from the subject site.

There is, technically, a risk of contamination from the identified sites and without further site investigation into site design and operational procedures the risk and future liability of contamination through such media can not be quantified. However, the registering of radioactive substances is strictly controlled by the Health and Safety Executive, and it may be assumed that the holders of the authorisations act professionally and responsibly to prevent any escape of radioactive substances or radiation.

3.8 Radon

Radon gas can be derived from naturally occurring uranium found in small quantities in soils and rocks. The action level for radon, set by the National Radiological Protection Board (NRPB) is 200 Bqm^{-3}. Above that level, measures to exclude radon from homes are recommended.

The information from the NRPB records show that the site falls into the lowest category, i.e. less than 1% of homes are above the action level. The NRPB do not recommend

further testing of individual properties falling into this category. Information from the British Geological Survey also states that no radon protective measures are necessary.

The likelihood of any contamination from radon affecting the site in terms of health, comfort and safety is therefore negligible.

3.9 Contemporary Trade Directory Entries (of possible contaminative use) and Fuel Station Entries

There are 40 listed trade directory entries that are considered to be potentially contaminative within 500m of the site. They refer to operations that are predominantly small and medium sized operations typically involved with the storage, manufacture use or disposal of hazardous materials. Companies that handle hazardous materials in greater quantities would usually posses an authorisation to operate as noted in section 3.6 above. The smaller sites which fall under this regulatory threshold may therefore actually create more pollution. The likelihood of any contamination from the identified sites affecting the site area would be difficult to determine without site investigations. The fact that 40 such sites are listed does confirm the industrial setting of the area and allows a level of risk to be assigned based upon the precautionary principal.

4. SITE WALKOVER

4.1 Site And Process Description

Wardell Armstrong visited the site was on 14 May 2002, accompanied by Mr. Simon Griffiths, Health and Safety Manager for Bill Howarth Metals Limited The site comprises a large warehouse building, which is one of the original buildings on the site. There is also a yard area and a further three buildings facing onto Jersey Street which are used as offices, and for dispatch and maintenance purposes.

4.1.1 Warehouse and sorting area.

The warehouse houses three sloping hearth furnaces and an ingot caster. This building has been extended to the rear (north) to provide storage space for aluminium ingots prior to dispatch. There is also a metal baler which is housed below floor level; aluminium can be fed into the baler which bales and compresses the metal. This is used in the main for aluminium cans which are sold on. Aluminium to be used in the process is classed as either "irony" or clean. As the name suggests "irony aluminium" is that which is either fixed to non aluminium components, such as engine blocks for example, or aluminium alloys. Clean aluminium is metal which contains a higher percentage of aluminium.

Scrap metal is brought onto the site, weighed and then tipped in the sorting area between the southern most wall of the warehouse and the southern site boundary wall. This area is open sided but is partially roofed; the ground is good quality concrete. There is a second sorting area located along the western wall of the main warehouse. Material is deposited here until space becomes available in the main sorting area. The scrap metal is often coated in a thin layer of lubricating oil which, over time, has lead to some staining of the concrete surface of the storage areas.

4.1.2 The Yard Area

The yard area is to the rear of the office and maintenance buildings and is also bordered to the east and north by neighbouring buildings. The yard area has a concrete surface, extending away from the warehouse across half to two thirds of the yard area. Beyond this yard was a cobbled surface and in parts a hardcore surface which, through weathering and deposition of mud, appears to be soft cover.

The northern half of the yard area on the hardstanding is used primarily for storage of skips and furnace dross. A decommissioned furnace also stands in this part of the yard. In the north east corner of the yard adjacent to the warehouse building is a large bunded oil tank which holds 7,000 gallons of oil; the bottom of this bund is badly stained with oil. There is also a smaller tank located outside the bund wall.

4.1.3 Offices & Maintenance Buildings

The office and maintenance facilities are located in three buildings which face onto Jersey Street. Number 97 Jersey Street was previously used as a taxi depot and has only recently been acquired by Bill Howarth Metals. The middle building is used as a maintenance depot for the works. There is a good quality concrete floor to this building and a limited storage of hazardous liquids such as oils takes place here. The third building is 109 Jersey Street. The interior of the building is accessible through a large shuttered door, and this area is used as a dispatch area for ingots, although some trucks are loaded in the yard. Part of the ground floor of this building has also been partitioned off for office use, and there is office space on two other floors.

4.1.4 General Process Operation

The furnaces are operated under a Local Authority Air pollution Control Permit which is regulated by Manchester City Council. The furnaces are fired by air and recycled oil; the oil is stored in the bunded oil tank within the yard area. Bill Howarth Metals generally only operate two of the three furnaces at any one time, however during the visit all three furnaces were in operation. The furnaces are operated 24 hours a day for 6 days a week.

The furnaces are charged with scrap aluminium throughout this period. The low melting point and the low density of aluminium ensure that denser metals slide to the back of the furnace while the molten aluminium floats to the surface. The dross and other metal content can then be raked out of the furnace. The dross is stored in the yard and is then sold on to other reclamation specialists. One furnace labelled F2 on Drawing LE02660/002 is dedicated to the "irony aluminium"; this is to reduce contamination of the other furnaces.

Silicon and potassium aluminium fluoride, as well as other metals, are added in small quantities depending on the particular grade of aluminium required. Once the metal is at the required grade, it is released through a valve into the ingot caster. The castor is situated on a conveyor in a water filled pit. The ingot caster is cooled by water which is pumped from the pit, the water draining back into the pit. The ingot caster turns at the head of the conveyor and the ingot is collected. The water in this pit appears to be 'clean', however, we have no record of its chemical composition. This pit is refilled with water as required and is emptied only infrequently. However, Wardell Armstrong were able to observe this pit being pumped out. The water was allowed to drain across the yard, which is stained with oil, and into a surface water drain. The discharge of this water may technically require a discharge consent as it is disposal of process cooling water. The discharge point of the drain should also be checked to discover whether it discharges to foul sewer or surface waters. The integrity of the drain may also need to be checked as any leakage from this drain could present a contamination risk.

5. GEOLOGICAL AND MINING POSITION

5.1 Superficial Strata

The published geological mapping, Lancashire Sheet 102 NE 1950 edition on the 1:10560 scale, indicates the superficial strata below the site to comprise glacial boulder clays of an unspecified thickness. Nearby boreholes record the glacial clays to be in the region of 20 metres thick. Due to the industrial use of the site it is likely that made ground will be present above the natural deposits.

5.2 Solid Strata

The superficial deposits are directly underlain by Manchester Marls Group strata which dip approximately 14° to the south west. These marls are underlain by Sherwood Sandstone Group strata at approximately 75 metres below ground level and Coal Measures strata at approximately 120 metres below ground level. No significant geological faults are recorded beneath or immediately adjacent to the site. The nearest recorded significant geological fault is the Cheetham Fault which trends north west to south east and terminates approximately 200 metres to the north of the site.

5.3 Mining

There are recorded mine workings beneath the site in 4 seams of coal between 360 metres and 970 metres depth. There are no recorded mine workings at shallow depth beneath the site. However, since it only became a requirement to record mineworkings in 1872, it is possible that other, unrecorded workings exist beneath the site.

There are no recorded mine entries on or immediately adjacent to the site.

5.4 Hydrogeology

The Manchester Marls beneath the site are classified as a non-aquifer due to their relatively impermeable nature. Sherwood Sandstones which are located to the east and west of the site are classified as a major aquifer. The superficial deposits a classified as being of high leaching potential. Because the site is located in an urban area and the classification is based on fewer observations, a worst case scenario is adopted.

6. INTRUSIVE SITE INVESTIGATION

6.1 Introduction

The desk study demonstrates that the subject site has been in industrial use within a formerly heavily industrialised area for over a century. Hazardous activities have been carried on there, and indeed the present storage of large volumes of hazardous liquids and the infilling of the canal with undetermined fill material (see Table 1) warranted a limited intrusive investigation to assess the contamination status of the ground. An intrusive investigation and the taking of soil samples for laboratory testing from areas of the site which are deemed to be 'hotspots' for soil contamination highlight potential contamination issues which may be worthy of further investigation.

6.2 Sampling Methodology

6.2.1 Sample Collection

Under supervision of Wardell Armstrong, Southern Ground Testing of Bridgend carried out window sampling on 08 June 2002 at the locations shown on drawing number LE02660/003. The locations were selected by Wardell Armstrong based upon the likelihood of contamination being present and the sensitivity of the location to contamination. Also taken into consideration was the absence of underground services and the need to minimise disruption to the operation of the business. Each borehole was logged by Wardell Armstrong and the borehole logs are included as Appendix A. The strata shown on the logs were recorded as each core sample was removed from the ground. All samples taken correspond with the strata and depth indicated on the logs the samples were sent for chemical testing at a laboratory.

6.3 Contamination Results

6.3.1 Testing methodology

ALcontrol Geochem, Chester, carried out analysis of the soil samples; a copy of the Certificate of Analysis is attached at Appendix B.

The results of the testing provide a contamination baseline for the site against which any future testing results can be compared. Once the nature and degree of contamination is known the information can assist in identifying any change in contamination status, and with identifying liabilities for any future occurrence of contamination.

To set the degree of contamination present on the site in an appropriate context the results of the testing have been assessed against a range of chemical contaminants listed in the Interdepartmental Committee on the Redevelopment of Contaminated Land publication ICRCL 59/83 second edition. The guidelines list 'threshold trigger concentrations' below which contamination can reasonably be ignored and 'action trigger

concentrations' (for selected contaminants) above which some form of remedial action is required before development can safely proceed. Between the two trigger concentrations further consideration should be given to the contamination status of the site, and the need for any remedial work based on informed judgement.

The trigger concentrations are dependent on the proposed end use of the site and ICRCL 59/83 second edition lists threshold contaminant levels for grades of end use;

- Domestic gardens
- Parks, playing fields and open space.
- Buildings and hardcover.

For the purpose of this report we have used the trigger levels for buildings and hardcover where these are quoted and where not, for open space.

Two of the soil samples also had a leachate analysis carried out. Leachate analysis provides an indication of whether a contaminant is bonded within the soil structure, or whether the contaminant is free to percolate through the soil in the presence of water. Should contaminants be mobile in the soil the potential for contamination of groundwater increases significantly.

6.4 Summary of results

The following summarises the findings of the intrusive survey by describing the elevated determinands at each sample point. Determinands which have been shown by the laboratory testing to be at a concentration lower than the ICRCL threshold trigger value have not been described.

The full chemical testing results are included in Appendix B.

6.4.1 Location WS1

Located in the scrap sorting area adjacent to the western external wall of the warehouse. This borehole reached a depth of 2m below ground level and three soil samples were taken.

Elevated determinands identified are:

Copper

Copper is considered toxic to plants but not normally to human health.

In areas where plants are to be grown the threshold trigger concentration is 130ppm

- A concentration of 1444ppm was recorded in sample S1/D1 @ 0.15 – 0.25m
- The recorded concentrations in the samples taken from lower strata were significantly reduced

Lead

Lead may pose a hazard to human health

The ICRCL guidance states that in parks playing fields and open space the threshold trigger concentration is 2,000ppm

- A concentration of 2,384ppm was recorded in sample S1/D1 @ 0.15 – 0.25m
- The recorded concentrations in the samples taken from lower strata were significantly reduced.

Zinc

Zinc is considered toxic to plants but not normally to human health.

The ICRCL guidance states that in areas where plants are to be grown the threshold trigger concentration is 300ppm

- A concentration of 913ppm was recorded in sample S1/D1 @ 0.15m – 0.25m
- A Concentration of 355ppm was recorded in sample S1/D2 @ 0.75m – 0.85m
- Concentrations recorded in lower strata were lower than the threshold trigger concentrations.

Oils

There is no specific trigger concentration set by the ICRCL guidance for mineral oils, however a level of 1,000ppm would be a sensible level at which further investigation may be warranted.

- A concentration of 6,016ppm was recorded in sample S1/D1 @ 0.15m – 0.25m
- Concentrations recorded in lower strata were significantly lower than this figure

Polyaromatic hydrocarbons

The ICRCL guidance states that for hard cover areas the threshold trigger concentration is 1,000ppm while the action trigger concentration level is 10000

- A concentration of 2,323 ppm was recorded in sample S1/D1 @ 0.15m – 0.25m
- Concentrations recorded in lower strata were significantly lower than this figure

Sample location one was located in an area used for the storage of scrap metal, which is often contaminated to some degree with oil. The majority of the contamination was recorded in the upper strata, which comprises sandy gravel with some ash fragments. The elevated levels of lead and copper and zinc are consistent with ash and clinker fill which may have been produced by either the iron foundry or the glass works which previously occupied the site. The presence of the elevated oils is however is more likely to be a result of storing oil contaminated metals on the concrete above.

Zinc was discovered in elevated concentrations in the strata below, which may suggest the zinc is mobile.

6.4.2 Location WS2

Arsenic

Arsenic may pose a risk to human health

The ICRCL guidance states that in parks playing fields and open space the threshold trigger concentration is 40ppm

- The concentration of arsenic in samples S2/D2 @ 1.75m – 1.95m and S2/D3 @ 3.4m – 3.5m both exceed the threshold trigger concentration.
- Elevated concentrations were not found in lower strata @ 3.8m – 3.9m

Copper

Copper exceeds the threshold trigger concentration in three of the four samples taken from sample location WS2. The only sample not to exceed the limit was S2/D4 which was the only sample taken in the underlying natural clay: This would suggest that there is no significant vertical migration of copper.

The test carried out on the leachate from sample S2/D2 recorded a concentration of copper of <0.05ppm, which suggests that there will be no migration of copper from that stratum.

Nickel

Nickel is considered toxic to plants and not normally hazardous to human health

The ICRCL guidance states that in areas where plants are to be grown the threshold trigger concentration is 70ppm

- A concentration of 151ppm was recorded in sample S2/D1 @ 1.0m – 1.25m
- A concentration of 73ppm was recorded in sample S2/D3 @ 3.4m – 3.5m

Elevated concentrations were not found in lower strata @ 3.8m – 3.9m

Zinc

The ICRCL guidance states that in areas where plants are to be grown the threshold trigger concentration is 300ppm

- A concentration of 531ppm was recorded in sample S2/D1 @ 1.0m – 1.25m
- A concentration of 1,512ppm was recorded in sample S2/D2 @ 1.75m – 1.95m
- A concentration of 944ppm was recorded in sample S2/D3 @ 3.4m – 3.5m
- The zinc found in the leachate sample prepared from S2/D2 showed a concentration of <0.05ppm zinc which would indicate that the zinc is not mobile in its present state.

Mineral Oil

- A concentration of 3,1286ppm of mineral oils was found in sample S2/D2
- A concentration of 1,8740ppm of mineral oils was found in sample S2/D3

Elevated concentrations were not found in lower strata @ 3.8m – 3.9m.

Polyaromatic Hydrocarbons

The ICRCL guidance states that for buildings and hardcover areas the threshold trigger concentration level of PAH is 1000ppm and the action level is 10,000

- A concentration of 3,225ppm was recorded in sample S2/D2 @ 1.75m – 1.95m
- A concentration of 2,530ppm was recorded in sample S2/D3 @ 3.4m – 3.5m

6.4.3 Location WS3

This sample was located in order to test the type and depth of fill material within the former canal area. However no samples were collected in the upper 2.5m due to the quantity of oil in the hole and the looseness of fill material. No sample of the oily material was taken in location WS3 as the oil prevented enough soil from being recovered in order to meet the minimum quantity required for testing.

- Elevated concentrations of copper (250ppm); nickel (328ppm); lead (1259ppm); zinc (583ppm) were recorded in sample S3/D1@ 2.5m – 3.0m

No elevated levels of contaminants were found in the lower strata, in addition the observed levels of oil in the upper strata were not found below 2.5m in depth.

6.4.4 Location WS4

This sample location was chosen to to gauge whether there had been any obvious contamination due to of leakages from the caster pit.

- Sample S4/D1 recorded a concentration of mineral oils of 1,853ppm

The slightly elevated level of mineral oils at this location is higher than expected particularly as there is no visible staining to the surface concrete or oil storage/ at that location. The level of mineral oils was significantly lower in the underlying stratum.

6.4.5 Location WS5

Location WS5 was chosen as it was on the edge of the "irony aluminium" storage area. This area stores predominantly engine parts, which generally leak oil
Two samples were taken from at this location the first at 1.7m – 1.9m and then at 2.6m – 2.7m.

- No elevated levels of any determinands were recorded at this sample location.

6.4.6 Location WS6

This location was sited adjacent to the bailer. The bailer is housed in a purpose built pit below ground level. There appeared to be oil lying within the base of this pit.
The window sample rig could not progress though hard material at 0.5m, therefore only one near surface sample was taken.

- Sample S6/D1 recorded elevated levels of copper and zinc

6.4.7 Location WS7

This location was situated in the irony aluminium sorting area
Two samples were taken at this location, firstly at 0.15m – 0.25m, then at 2.6m – 2.7m

- No elevated levels of any determinands were recorded at this sample location.

6.4.8 Aluminium

Aluminium was found in comparatively high concentrations across the site when compared to other metals that were discovered. These figures may appear to correlate with the use of the site use as an aluminium foundry, however it is known that aluminium is one of the most abundant metals found in the Earth's crust. The main chemical constituents of clays are aluminosilicates; the main constituents being silica (SiO_2) and alumina (Al_2O_3). Marls, clays and coal measure shales typically contain between 16 and 23%, alumina. The highest percentage found at the subject site was 15% in sample S2/D3 which was taken from the interface between a dark grey silty stratum and a stiff sandy clay. The concentrations of aluminium across the site do not correlate with any specific activity or expected hotspot such as the casting pit. It would appear therefore that the aluminium is naturally occurring and not a result of activities carried out at the foundry.

6.5 Discussion of Results

From the results that have been obtained from the survey it would appear that site appears to contain elevated levels of copper, zinc nickel and lead at shallow depth. These metals are consistent with the former uses of the site as both a iron foundry and a glass works and, to a lesser extent, the present site use. Arsenic is also shown to be very slightly elevated in one location. None of the contaminants appears to be mobile and thus able to migrate away from the site.
Within an industrial setting and provided that the quality of the surfaced areas is maintained in a good condition to prevent the downward percolation of water and of contaminants, the presence of these metals should not represent a significant contamination.

However, there does appear to be a more significant issue with the presence of oil contamination in the vicinity of the oil tank. The results from location WS2 demonstrate the concentration of the oil adjacent to the tank to be high. The results from WS3 showed that the oil had migrated in quantity to a position at least 3 – 4m away from the oil bund wall.

WS3 was situated in the area of the site which is suspected to be an infilled canal, and the loose fill material may form a conduit through which the oil can travel. This may be exacerbated by the lack of hardstanding above the canal area at the far west of the yard area, which is outside the Bill Howarth Metals ownership boundary. The lack of hardstanding may allow water to percolate into the fill and carry the oil away from its source.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The site, an aluminium foundry located in Jersey Street in Ancoats, has been in industrial use for over 150 years. Site uses have included an iron foundry and a glass works. A branch of a canal ran across the northern part of the site before being infilled during the late 1940's. Potentially contaminative land uses are still prevalent in Ancoats and surrounding areas.

Housekeeping at the site is generally good, however spillages from the oil storage tank do not appear to have been dealt with adequately, the base of the bunded area is heavily stained with oil as are areas outside the bund wall.

Cooling water from the castor pit is allowed to drain across the yard area and may allow oil and other contaminants to be carried into the drain. The pumping of this water and its disposal to a drain should probably have a discharge consent.

An intrusive survey of the site indicated elevated levels of metals on the site; this metal contamination is consistent with the former uses of the site and potentially from the site current use. These metal contaminants do not appear to be mobile, and thus currently do not pose a significant contamination risk.

Oil contamination was found in two sample locations near the oil storage tank; with significant quantities of oil being present in loose fill material within the former canal. The oil appeared to have spread both laterally and vertically at least three metres from the source. There is a potential for this oil to migrate along the course of the former canal.

7.2 Recommendations

The extent of the oil contamination should be determined through further intrusive testing to determine the significance of the problem and to allow an informed judgement to be made with regard to possible treatment options.

In the short term the oil storage area should be cleaned up and proper attention paid to spillages.

The practice of draining process water into a drain should be more carefully controlled and the possible need for a discharge consent for this activity should be investigated.

Appendix A
Borehole Logs

Wardell Armstrong
Engineering & Environmental Solutions

Site	Borehole Number
Jersey Street, Manchester	WS1

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion			Bill Howarth	LE02660

Location	Dates	Engineer	Sheet
Scrap storage area	08/06/02 - 08/06/02	Wardell Armstrong	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.15) 0.15	MADE GROUND - Concrete Hardstanding		
0.15-0.25	D1						MADE GROUND - Sandy gravel ballast fill with coal and ash fragments		
						(0.55) 0.70			
0.75-0.85	D2						MADEGROUND - Fine sandy clay with gravel		
						(0.30) 1.00			
1.30-1.45	D3						Firm brown slightly sandy CLAY witjh grey silt laminations		
						(1.00) 2.00			
							Complete at 2.00m		

Remarks

Scale (approx)	Logged By
1:25	NJC

Figure No.
LE02660.WS1

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Wardell Armstrong
Engineering & Environmental Solutions

Site	Borehole Number
Jersey Street, Manchester	WS2

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion			Bill Howarth	LE02660
	Location	**Dates**	**Engineer**	**Sheet**
	Adjacent to oil tank	08/06/02 - 08/06/02	Wardell Armstrong	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.15) 0.15	Concrete		
						(0.85) 1.00	MADE GROUND - sand, ash, brick fragments and gravel		
1.0 -1.25	D1						MADE GROUND - sand, ash brick oil		
1.75-1.95	D2					(2.00) 3.00			
						(0.50) 3.50	Dark grey / black SILT and gravel		
3.40-3.50	D3						Stiff dark brown slightly sandy CLAY		
3.80-3.90	D4					(0.40) 3.90			
							Complete at 3.90m		

Remarks

Scale (approx)	Logged By
1:25	NJC

Figure No. LE02660.WS2

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Wardell Armstrong
Engineering & Environmental Solutions

Site	Borehole Number
Jersey Street, Manchester	WS3

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion			Bill Howarth	LE02660

Location	Dates	Engineer	Sheet
North of Yard (canal area)	08/06/02 - 08/06/02	Wardell Armstrong	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.15) 0.15	MADE GROUND - Concrete		
							MADE GROUND -		
						(0.85)			
						1.00	MADE GROUND		
						(1.50)			
2.50-3.00	D1					2.50	Dark grey / black SILT & gravel		
						(0.50)			
						3.00	Stiff dark brown slightly sandy CLAY		
3.20-3.50	D2					(0.50)			
						3.50	Complete at 3.50m		

Remarks
LIMITED RECOVERY OF SAMPLE DUE TO AMOUNT OF OIL
LIMITED RECOVERY OF SAMPLE DUE TO AMOUNT OF OIL

Scale (approx)	Logged By
1:25	NJC

Figure No.
LE02660.WS3

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Wardell Armstrong
Engineering & Environmental Solutions

Site	Borehole Number
Jersey Street, Manchester	WS4

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion			Bill Howarth	LE02660
	Location	**Dates**	**Engineer**	**Sheet**
	Adjacent to casting pit	08/06/02 - 08/06/02	Wardell Armstrong	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.18) 0.18	MADE GROUND - Concrete		
							MADE GROUND - Clayey sand, brick fragments and some gravel		
1.00-1.30	D1					(1.32)			
						1.50	Firm brown slightly sandy CLAY with grey silt laminations		
1.80-1.90	D2					(0.50)			
						2.00	Complete at 2.00m		

Remarks

Scale (approx)	Logged By
1:25	NJC

Figure No. LE02660.WS4

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Wardell Armstrong
Engineering & Environmental Solutions

Site	Borehole Number
Jersey Street, Manchester	WS5

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion			Bill Howarth	LE02660
	Location	**Dates**	**Engineer**	**Sheet**
	Adjacent top irony aluminium	08/06/02 - 08/06/02	Wardell Armstrong	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.15) 0.15	MADE GROUND - Concrete		
							MADE GROUND - sandy gravelly fill with brick fragments		
						(1.55)			
						1.70			
1.70-1.90	D1					(0.30)	MADE GROUND - Light grey sandy clay with oil staining		
						2.00			
							Stiff dark brown sandy CLAY with occasional gravel		
						(1.00)			
2.60-2.70	D2					3.00			
							Complete at 3.00m		

Remarks	Scale (approx)	Logged By
	1:25	NJC
	Figure No.	
	LE02660.WS5	

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Wardell Armstrong
Engineering & Environmental Solutions

Site	Borehole Number
Jersey Street, Manchester	WS6

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion			Bill Howarth	LE02660
Location	**Dates**	**Engineer**	**Sheet**	
Adjacent to crusher	08/06/02 - 08/06/02	Wardell Armstrong	1/1	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.40	D1					(0.15) 0.15	MADE GROUND - Concrete		
						(0.35)	MADE GROUND - Sandy Clay with brick fragments and gravel		
						0.50	Complete at 0.50m		

Remarks

Scale (approx)	Logged By
1:25	NJC

Figure No. LE02660.WS6

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Wardell Armstrong
Engineering & Environmental Solutions

Site	Borehole Number
Jersey Street, Manchester	WS7

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion			Bill Howarth	LE02660
	Location	**Dates**	**Engineer**	**Sheet**
	Adjacent to scrap store	06/06/02 - 06/06/02	Wardell Armstrong	1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.15) 0.15	MADE GROUND - Concrete		
0.60-0.70	D1					(1.35)	MADE GROUND - Black sand and gravel		
						1.50			
						(0.20) 1.70	MADE GROUND - Limestone fill		
2.60-2.70	D2					(1.30)	Stiff dark brown sandy CLAY and occasional gravel		
						3.00	Complete at 3.00m		

Remarks

Scale (approx)	Logged By
1:25	NJC

Figure No. LE02660.WS7

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Appendix B
Laboratory Results

ALcontrol Geochem

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

CERTIFICATE OF ANALYSIS

Client: Wardell Armstrong
2 The Avenue
Leigh
Lancashire
WN7 1ES

Attention: Nick Clarke

Date: 3 July, 2002

Our Reference: 02/06274/02/01

Your Reference: LE02660

Location: Howarth Metals Ltd

A total of 16 samples were received for analysis on Wednesday, 12 June 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

Lisa Banks
Site Manager
Analytical Services

Compiled By
Simon Hay

ALcontrol Geochem is a trading division of ALcontrol UK Limited.
Registered Office: Templeborough House, Mill Close, Rotherham S60 1BZ. Registered in England and Wales No. 4057291

UKAS TESTING
1291

ALcontrol Geochem
TEST SCHEDULE

JOB NUMBER : 02/6274/02
CLIENT : Wardell Armstrong
CONTACT : Nick Clarke
DATE OF RECEIPT : 12/06/02
LOCATION : Howarth Metals Ltd

BATCH NUMBER : 1
CLIENT REF/CODE : LE02660
ORDER NUMBER : 3742
TURNAROUND : 10 days

Numeric values indicate additional scheduling

* indicates test subcontracted

Sample Number	Sample Identity	P / V	Depth	Sample Type	ICP ICRCL (9)	B (H2O Sol)	Cr VI	Total cyanide	Free CN Soil	Thiocyanate	Tot. SO4 by ICP	Total sulphur	Ac.Sol.Sulphide	pH (soil)	Phenol prep	Tot Phen HPLC	Solv. Ext. Matter	Thin-layer chro.	PAH by MS	Diesel rng orgs	Mineral Oil GC	NRA leach	ICP (10) Leach	Cr VI on leach	Tot. cyan. leach	Free CN Leach	Thiocyan. Leach	SO4 leachate
	UKAS Accredited ?				✓	✓		✓		✓		✓		✓		✓	✓	✓	✓	✓	✓		✓		✓		✓	✓
1	S1/D1	TUB	0.15-0.25	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
2	S1/D2	TUB	0.75-0.85	SOIL	X	X		X			X	X	X	X	X	X	X											
3	S1/D3	TUB	1.30-1.45	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
4	S2/D1	TUB	1.00-1.25	SOIL	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X							
5	S2/D2	TUB	1.75-1.95	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X
6	S2/D3	TUB	3.40-3.50	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X								
7	S2/D4	TUB	3.80-3.90	SOIL	X	X		X			X	X	X	X	X	X	X			X								
8	S3/D1	TUB	2.50-3.00	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
9	S3/D2	TUB	3.20-3.50	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
10	S4/D1	TUB	1.00-1.30	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X
11	S4/D2	TUB	1.80-1.90	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
12	S5/D1	TUB	1.70-1.90	SOIL	X	X	X	X	X	X	X	X	X	X	X	X			X									
13	S5/D2	TUB	2.60-2.70	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
14	S6/D1	TUB	0.20-0.40	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
15	S7/D1	TUB	0.15-0.25	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
16	S7/D2	TUB	2.60-2.70	SOIL	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
	Total Number of Tests				16	16	14	16	14	14	16	16	16	16	16	16	13	12	3	4	2	2	2	2	2	2	2	2

Checked By

Name : Sheila Clayton

Printed : 13/06/02 18:03:42

ALcontrol Geochem
TEST SCHEDULE

JOB NUMBER : 02/6274/02
CLIENT : Wardell Armstrong
CONTACT : Nick Clarke
DATE OF RECEIPT : 12/06/02
LOCATION : Howarth Metals Ltd

BATCH NUMBER : 1
CLIENT REF/CODE : LE02660
ORDER NUMBER : 3742
TURNAROUND : 10 days

Numeric values indicate additional scheduling

* indicates test subcontracted

Sample Number	Sample Identity	P / V	Depth	Sample Type	Sulphide Leach	pH of leachate	Tot Phen Lch HPLC	Free Sulphur Leach	Tot. ext. leach.	TLC on leach.
	UKAS Accredited ?				✓	✓			✓	✓
1	S1/D1	TUB	0.15-0.25	SOIL						
2	S1/D2	TUB	0.75-0.85	SOIL						
3	S1/D3	TUB	1.30-1.45	SOIL						
4	S2/D1	TUB	1.00-1.25	SOIL						
5	S2/D2	TUB	1.75-1.95	SOIL	X	X	X	X	X	X
6	S2/D3	TUB	3.40-3.50	SOIL						
7	S2/D4	TUB	3.80-3.90	SOIL						
8	S3/D1	TUB	2.50-3.00	SOIL						
9	S3/D2	TUB	3.20-3.50	SOIL						
10	S4/D1	TUB	1.00-1.30	SOIL	X	X	X	X	X	X
11	S4/D2	TUB	1.80-1.90	SOIL						
12	S5/D1	TUB	1.70-1.90	SOIL						
13	S5/D2	TUB	2.60-2.70	SOIL						
14	S6/D1	TUB	0.20-0.40	SOIL						
15	S7/D1	TUB	0.15-0.25	SOIL						
16	S7/D2	TUB	2.60-2.70	SOIL						
	Total Number of Tests				2	2	2	2	2	2

Checked By

Name : Sheila Clayton

Printed : 13/06/02 18:03:42

☐ Preliminary

☑ Validated

Table Of Results

Job Number: **02/06274/02/01** **Sample Type:** **SOIL**

Client: Wardell Armstrong Location: Howarth Metals Ltd

Date of Receipt: (of first sample) 12/06/02 Client Contact: Nick Clarke

Client Ref. No.: LE02660

	UKAS Accredited		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Units		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	Detection Method		ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP
	Method Detection Limit		<1	<1	<0.05	<0.05	<1	<1	<0.05	<1	<0.05	<1	<0.05	<1	<0.05	<1	<0.05	<1
Sample Number	**Sample Identity**	**Depth (m)**	**Aluminium**	**Arsenic**	**Arsenic On Leachate**	**Boron On Leachate**	**Boron (Water Soluble)**	**Cadmium**	**Cadmium on Leachate**	**Chromium**	**Chromium on Leachate**	**Copper**	**Copper on Leachate**	**Mercury**	**Mercury On Leachate**	**Nickel**	**Nickel On Leachate**	**Lead**
1	S1/D1	0.15-0.25	13700	26	-	-	<1	3	-	58	-	1444	-	<1	-	47	-	2384
2	S1/D2	0.75-0.85	9728	15	-	-	2	<1	-	52	-	44	-	<1	-	39	-	82
3	S1/D3	1.30-1.45	11910	3	-	-	2	<1	-	28	-	14	-	<1	-	59	-	27
4	S2/D1	1.00-1.25	6919	37	-	-	3	<1	-	63	-	467	-	<1	-	151	-	332
5	S2/D2	1.75-1.95	5085	46	<0.05	0.30	3	11	<0.05	53	<0.05	375	<0.05	<1	<0.05	44	<0.05	953
6	S2/D3	3.40-3.50	15390	118	-	-	2	3	-	65	-	507	-	6	-	73	-	804
7	S2/D4	3.80-3.90	10130	3	-	-	1	<1	-	24	-	14	-	<1	-	44	-	20
8	S3/D1	2.50-3.00	10740	35	-	-	3	1	-	279	-	250	-	2	-	328	-	1259
9	S3/D2	3.20-3.50	11340	2	-	-	<1	<1	-	26	-	17	-	<1	-	45	-	23
10	S4/D1	1.00-1.30	9693	14	<0.05	<0.05	1	<1	<0.05	305	<0.05	113	<0.05	<1	<0.05	89	<0.05	122
11	S4/D2	1.80-1.90	14670	3	-	-	<1	<1	-	32	-	14	-	<1	-	41	-	27
12	S5/D1	1.70-1.90	8349	<1	-	-	1	<1	-	14	-	11	-	<1	-	13	-	17
13	S5/D2	2.60-2.70	9770	3	-	-	<1	<1	-	25	-	11	-	<1	-	46	-	23
14	S6/D1	0.20-0.40	8071	23	-	-	2	2	-	23	-	672	-	<1	-	52	-	942
15	S7/D1	0.15-0.25	3850	44	-	-	<1	<1	-	80	-	66	-	<1	-	127	-	86
16	S7/D2	2.60-2.70	12790	8	-	-	<1	<1	-	47	-	25	-	<1	-	72	-	47

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 _____ Simon Hay

☐ Preliminary
☑ Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: 02/06274/02/01 **Sample Type:** SOIL
Client: Wardell Armstrong Location: Howarth Metals Ltd
Date of Receipt: (of first sample) 12/06/02 Client Contact: Nick Clarke
Client Ref. No.: LE02660

Sample Number	Sample Identity	Depth (m)	Arsenic	Arsenic On Leachate	Boron On Leachate	Boron (Water Soluble)	Cadmium	Cadmium on Leachate	Chromium	Chromium on Leachate	Copper	Copper on Leachate	Mercury	Mercury On Leachate	Nickel	Nickel On Leachate	Lead	Lead Leachate
UKAS Accredited			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Units			ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Method			ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP
Method Detection Limit			<1	<0.05	<0.05	<1	<1	<0.05	<1	<0.05	<1	<0.05	<1	<0.05	<1	<0.05	<1	<0.05
1	S1/D1	0.15-0.25	26	-	-	<1	3	-	58	-	1444	-	<1	-	47	-	2384	-
2	S1/D2	0.75-0.85	15	-	-	2	<1	-	52	-	44	-	<1	-	39	-	82	-
3	S1/D3	1.30-1.45	3	-	-	2	<1	-	28	-	14	-	<1	-	59	-	27	-
4	S2/D1	1.00-1.25	37	-	-	3	<1	-	63	-	467	-	<1	-	151	-	332	-
5	S2/D2	1.75-1.95	46	<0.05	0.30	3	11	<0.05	53	<0.05	375	<0.05	<1	<0.05	44	<0.05	953	<0.05
6	S2/D3	3.40-3.50	118	-	-	2	3	-	65	-	507	-	6	-	73	-	804	-
7	S2/D4	3.80-3.90	3	-	-	1	<1	-	24	-	14	-	<1	-	44	-	20	-
8	S3/D1	2.50-3.00	35	-	-	3	1	-	279	-	250	-	2	-	328	-	1259	-
9	S3/D2	3.20-3.50	2	-	-	<1	<1	-	26	-	17	-	<1	-	45	-	23	-
10	S4/D1	1.00-1.30	14	<0.05	<0.05	1	<1	<0.05	305	<0.05	113	<0.05	<1	<0.05	89	<0.05	122	<0.05
11	S4/D2	1.80-1.90	3	-	-	<1	<1	-	32	-	14	-	<1	-	41	-	27	-
12	S5/D1	1.70-1.90	<1	-	-	1	<1	-	14	-	11	-	<1	-	13	-	17	-
13	S5/D2	2.60-2.70	3	-	-	<1	<1	-	25	-	11	-	<1	-	46	-	23	-
14	S6/D1	0.20-0.40	23	-	-	2	2	-	23	-	672	-	<1	-	52	-	942	-
15	S7/D1	0.15-0.25	44	-	-	<1	<1	-	80	-	66	-	<1	-	127	-	86	-
16	S7/D2	2.60-2.70	8	-	-	<1	<1	-	47	-	25	-	<1	-	72	-	47	-

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 _____ Simon Hay

Printed at 15:30 on 03/07/02

☐ Preliminary
☑ Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: 02/06274/02/01 **Sample Type:** SOIL
Client: Wardell Armstrong Location: Howarth Metals Ltd
Date of Receipt: 12/06/02 Client Contact: Nick Clarke
(of first sample) Client Ref. No.: LE02660

	UKAS Accredited		✓	✓		✓	✓	✓	✓		✓	✓	✓	✓		✓		
	Units		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	Detection Method		ICP	ICP	ICP	ICP	ICP	Soxtec	TLC	TLC	TLC	TLC	TLC	TLC	Spectro	Spectro	Spectro	Spectro
	Method Detection Limit		<1	<0.05	<50	<1	<0.05	<10	<1	<1	<10	<10	<10	<1	<1	<0.05	<0.1	<0.03
Sample Number	Sample Identity	Depth (m)	Selenium	Selenium Leachate	Total Sulphate by ICP	Zinc	Zinc In Leachate	Solvent Extractable Matter	PAH Screen On Leachate	Mineral Oil by TLC Leachate	Min. Oil / Paraffin by TLC	Total PAH Screen by TLC	NSO / Resins	NSO / Resins Leachate	Acid Soluble Sulphide	Total Cyanide In Leachate	Hexavalent Chrome	Hexavalent Chrome On Leach
1	S1/D1	0.15-0.25	<1	-	1458	913	-	14100	-	-	6016	2323	5761	-	36	-	<0.1	-
2	S1/D2	0.75-0.85	<1	-	700	355	-	1029	-	-	-	-	-	-	70	-	-	-
3	S1/D3	1.30-1.45	<1	-	239	153	-	588	-	-	218	104	267	-	2	-	<0.1	-
4	S2/D1	1.00-1.25	<1	-	2396	531	-	-	-	-	-	-	-	-	20	-	<0.1	-
5	S2/D2	1.75-1.95	<1	<0.05	4427	1512	<0.05	39903	<1	<1	31286	3225	5392	<1	7	<0.05	<0.1	<0.03
6	S2/D3	3.40-3.50	<1	-	1631	944	-	18740	-	-	11078	2530	5132	-	82	-	<0.1	-
7	S2/D4	3.80-3.90	<1	-	369	63	-	824	-	-	-	-	-	-	2	-	-	-
8	S3/D1	2.50-3.00	<1	-	2723	583	-	-	-	-	-	-	-	-	182	-	<0.1	-
9	S3/D2	3.20-3.50	<1	-	320	67	-	271	-	-	98	89	84	-	<1	-	<0.1	-
10	S4/D1	1.00-1.30	<1	<0.05	1849	121	<0.05	2410	<1	<1	1853	194	363	<1	34	<0.05	<0.1	<0.03
11	S4/D2	1.80-1.90	<1	-	502	79	-	263	-	-	89	35	139	-	<1	-	<0.1	-
12	S5/D1	1.70-1.90	2	-	360	16	-	-	-	-	-	-	-	-	2	-	<0.1	-
13	S5/D2	2.60-2.70	<1	-	448	64	-	167	-	-	71	37	59	-	<1	-	<0.1	-
14	S6/D1	0.20-0.40	<1	-	5576	953	-	691	-	-	508	34	149	-	2	-	<0.1	-
15	S7/D1	0.15-0.25	<1	-	1562	40	-	259	-	-	115	55	89	-	<1	-	<0.1	-
16	S7/D2	2.60-2.70	<1	-	597	93	-	1189	-	-	879	99	210	-	<1	-	<0.1	-

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 _____ Simon Hay

☐ Preliminary
☑ Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: 02/06274/02/01 **Sample Type:** SOIL
Client: Wardell Armstrong Location: Howarth Metals Ltd
Date of Receipt: 12/06/02 (of first sample) Client Contact: Nick Clarke
Client Ref. No.: LE02660

	UKAS Accredited		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓				
	Units		ppm	ppm	ppm	ppm	ppm	ppm	ppm	%			ppm	ppm	ppm	ppm		
	Detection Method		Spectro	SPECTRO	Spectro	Spectro	HPLC	HPLC	HPLC	Leco	Meter	Meter	SPE	Spectro2	Ion Chr	Ion Chr		
	Method Detection Limit		<0.01	<3	<1	<0.2	<0.05	<0.01	<0.01	<0.01	<1.00	<1.00	<1	<2.5	<0.05	<2.5		
Sample Number	**Sample Identity**	**Depth (m)**	**Sulphide On Leachate**	**Sulphate In Leachate**	**Thiocyanate**	**Thiocyanate on leachate**	**Free Sulphur Leachate**	**Total Phenols HPLC**	**Tot. Phenols on Leach HPLC**	**Total Sulphur**	**pH of Leachate**	**pH Value In Soil**	**Total Extract Leachate**	**Total Cyanide**	**Free Cyanide Leachate**	**Free Cyanide Soil**		
1	S1/D1	0.15-0.25	-	-	<1	-	-	0.04	-	0.20	-	7.95	-	<2.5	-	<2.5		
2	S1/D2	0.75-0.85	-	-	-	-	-	0.10	-	0.12	-	7.56	-	<2.5	-	-		
3	S1/D3	1.30-1.45	-	-	<1	-	-	<0.01	-	0.01	-	7.60	-	<2.5	-	<2.5		
4	S2/D1	1.00-1.25	-	-	<1	-	-	0.07	-	0.34	-	7.56	-	<2.5	-	<2.5		
5	S2/D2	1.75-1.95	0.06	54	<1	0.4	<0.05	0.32	0.11	1.03	7.99	7.14	2	14.3	<0.05	<2.5		
6	S2/D3	3.40-3.50	-	-	<1	-	-	0.11	-	0.48	-	7.15	-	<2.5	-	<2.5		
7	S2/D4	3.80-3.90	-	-	-	-	-	<0.01	-	0.01	-	7.95	-	<2.5	-	-		
8	S3/D1	2.50-3.00	-	-	<1	-	-	0.14	-	0.43	-	6.85	-	36.9	-	<2.5		
9	S3/D2	3.20-3.50	-	-	<1	-	-	0.04	-	0.01	-	8.20	-	<2.5	-	<2.5		
10	S4/D1	1.00-1.30	0.06	67	<1	<0.2	<0.05	0.01	<0.01	0.19	7.97	7.73	2	14.5	<0.05	<2.5		
11	S4/D2	1.80-1.90	-	-	<1	-	-	0.04	-	0.01	-	7.57	-	<2.5	-	<2.5		
12	S5/D1	1.70-1.90	-	-	<1	-	-	<0.01	-	0.02	-	7.47	-	<2.5	-	<2.5		
13	S5/D2	2.60-2.70	-	-	<1	-	-	<0.01	-	0.01	-	7.82	-	<2.5	-	<2.5		
14	S6/D1	0.20-0.40	-	-	<1	-	-	<0.01	-	0.19	-	7.85	-	<2.5	-	<2.5		
15	S7/D1	0.15-0.25	-	-	<1	-	-	<0.01	-	0.09	-	8.58	-	<2.5	-	<2.5		
16	S7/D2	2.60-2.70	-	-	<1	-	-	<0.01	-	0.03	-	7.99	-	<2.5	-	<2.5		

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  Simon Hay

ALcontrol Geochem

Mineral Oil by GC

Job Number : 02/06274/02/01
Client : Wardell Armstrong
Ref : LE02660
Sample Type : SOIL
Units : mg/kg

Sample No	Sample Identity	Depth	Mineral Oil	Interpretation
4	S2/D1	1.0-1.25	22428	Biodegraded Diesel/Possible PAH's/Lube Oil
6	S2/D3	3.4-3.5	5161	PAH'S/Lube oil
7	S2/D4	3.8-3.9	58	Possible Kerosene Type Residues/Possible Lube Oil
8	S3/D1	2.5-3.0	4571	PAH'S/Lube oil

ALcontrol Geochem

Diesel Range Organics by GC

Job Number : 02/06274/02/01
Client : Wardell Armstrong
Ref : LE02660
Sample Type : SOIL
Units : mg/kg

Sample No	Sample Identity	Depth	Diesel Range Hydrocarbons	Interpretation
4	S2/D1	1.0-1.25	29904	Biodegraded Diesel/Possible PAH's/Lube Oil
6	S2/D3	3.4-3.5	6881	PAH'S/Lube oil
7	S2/D4	3.8-3.9	166	Possible Kerosene Type Residues/Possible Lube Oil
8	S3/D1	2.5-3.0	6095	PAH'S/Lube oil

ALcontrol Geochem

Job Number : 02/06274/02/01 **Client : Wardell Armstrong**

Ref : LE02660

	Method :	PAH by GCMS					
	Sample Type :	SOIL	SOIL	SOIL			
	Units :	µg/kg	µg/kg	µg/kg			
	Depth :	1.0-1.25	2.5-3.0	1.7-1.9			
	Sample Identity :	S2/D1	S3/D1	S5/D1			
	Sample Number :	4	8	12			
CAS N°	Compound	Conc	Conc	Conc	Conc	Conc	Conc
91-20-3	Naphthalene	4551	3040	115			
208-96-8	Acenaphthylene	827	609	17			
83-32-9	Acenaphthene	20179	10661	177			
86-73-7	Fluorene	16358	9874	168			
85-01-8	Phenanthrene	98959	54591	2613			
120-12-7	Anthracene	18229	15248	833			
206-44-0	Fluoranthene	80960	65957	4822			
129-00-0	Pyrene	64896	52799	3462			
56-55-3	Benz(a)anthracene	32595	38682	1625			
218-01-9	Chrysene	29605	9113	1761			
205-99-2	Benzo(b)fluoranthene	39841	34407	1682			
207-08-9	Benzo(k)fluoranthene	10123	6416	516			
50-32-8	Benzo(a)pyrene	22606	10884	759			
193-39-5	Indeno(123cd)pyrene	14916	12655	345			
53-70-3	Dibenzo(ah)anthracene	6355	5543	178			
191-24-2	Benzo(ghi)perylene	17708	12547	432			
	Total 16 PAH	478710	343025	19505			

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_6H_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

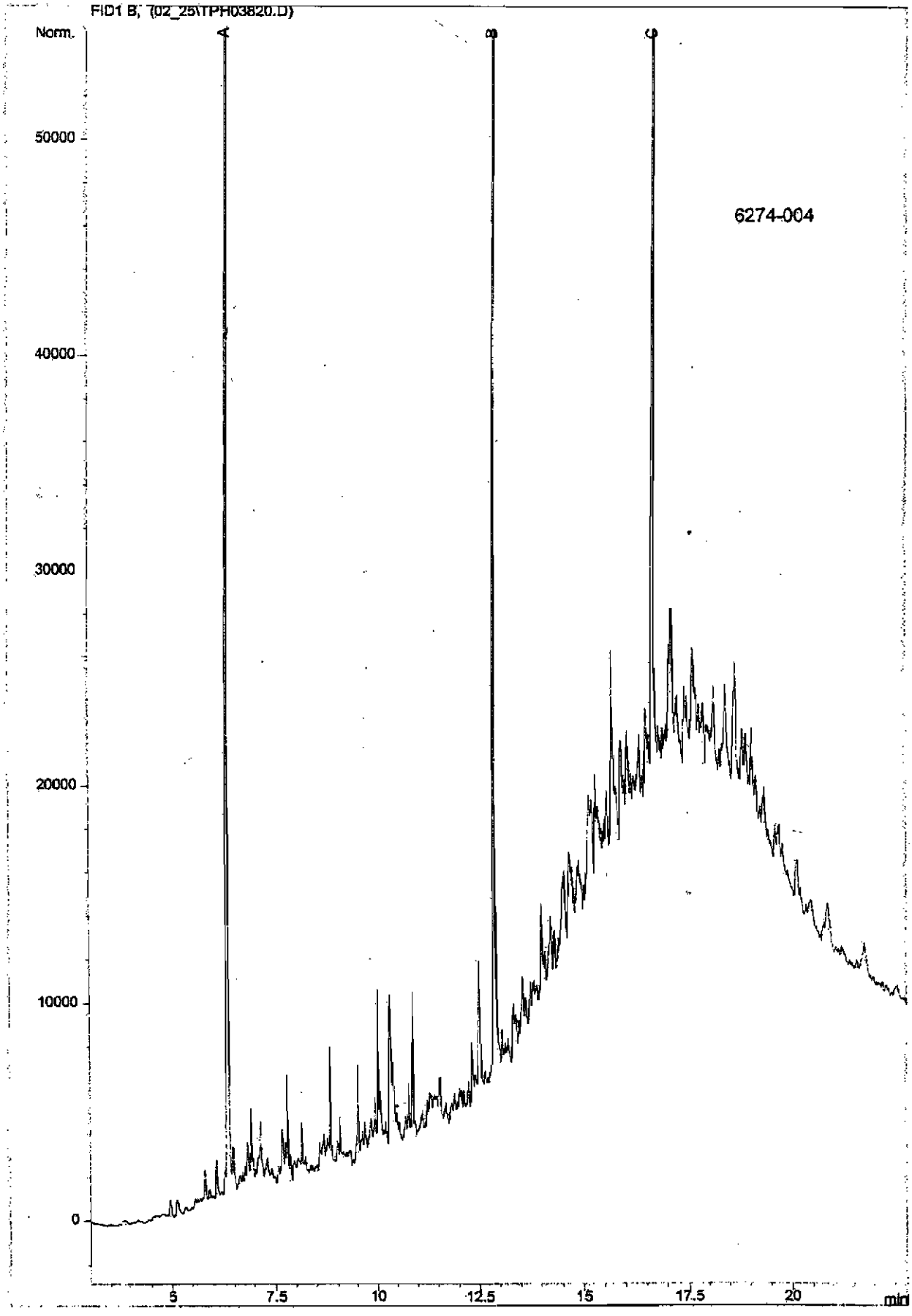
APPENDIX

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.

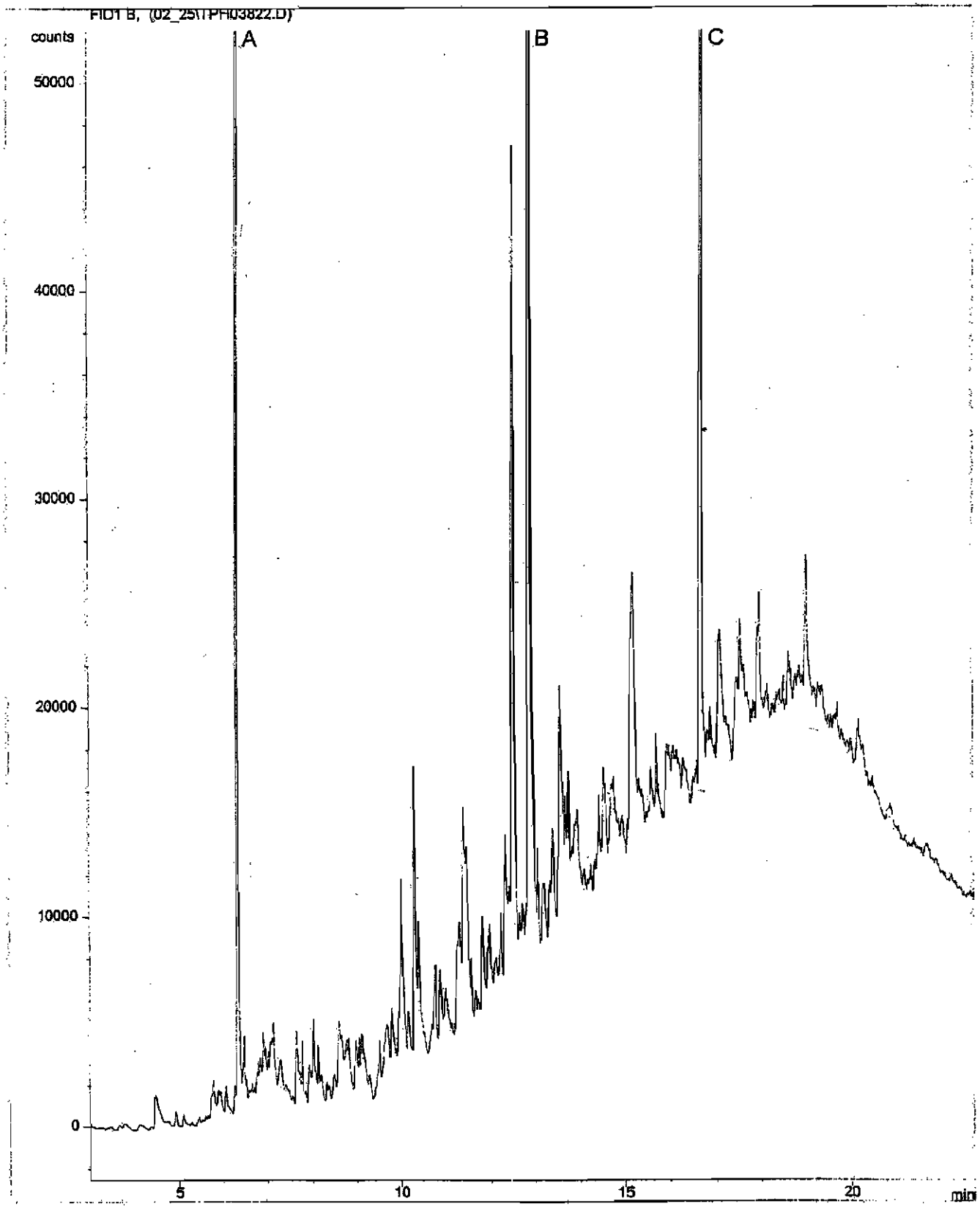
Print of window 38: Current Chromatogram(s)

Current Chromatogram(s)



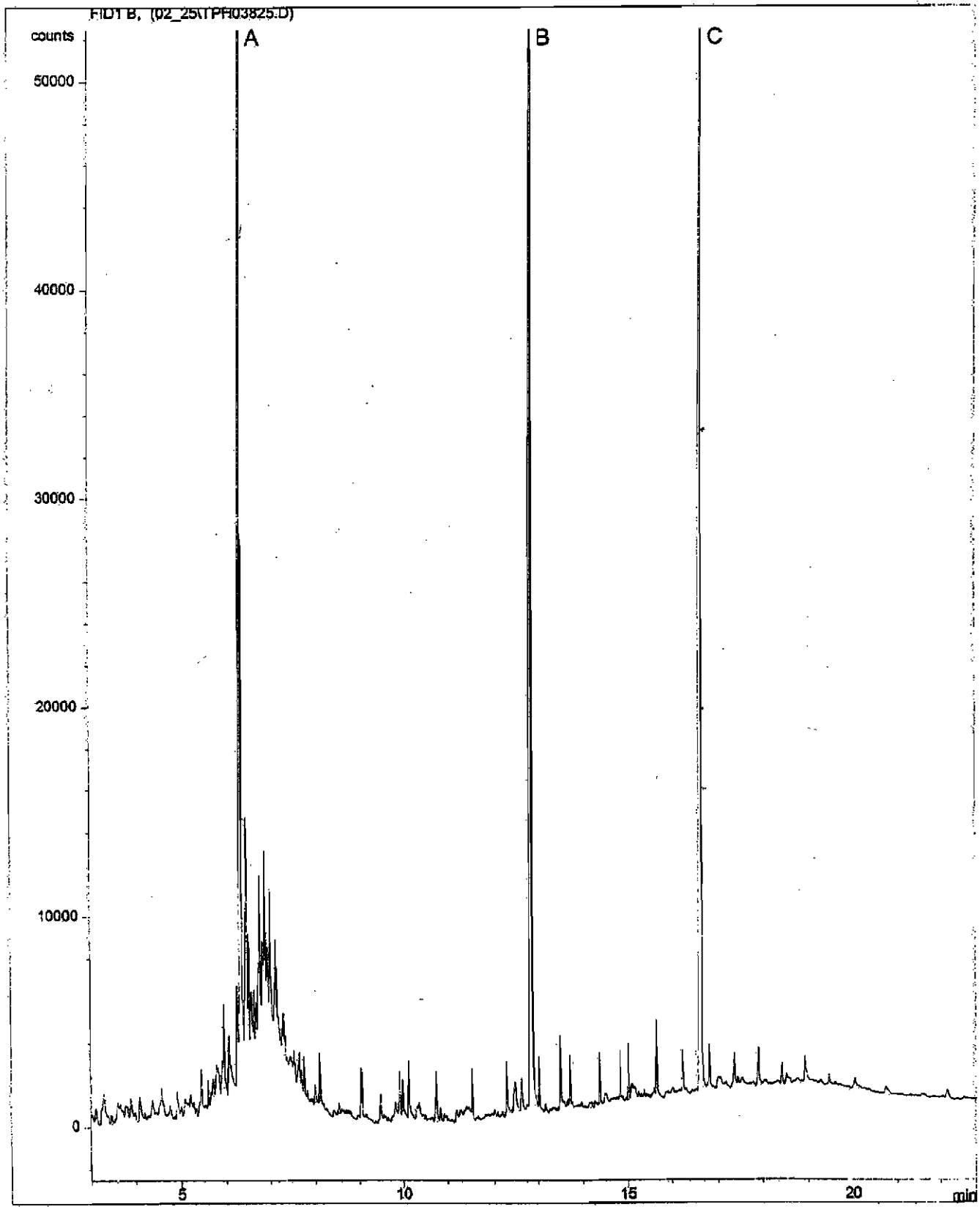
GEOCHEM ANALYTICAL SERVICES
Diesel Range Organics Analysis
By G.C.

6274-006



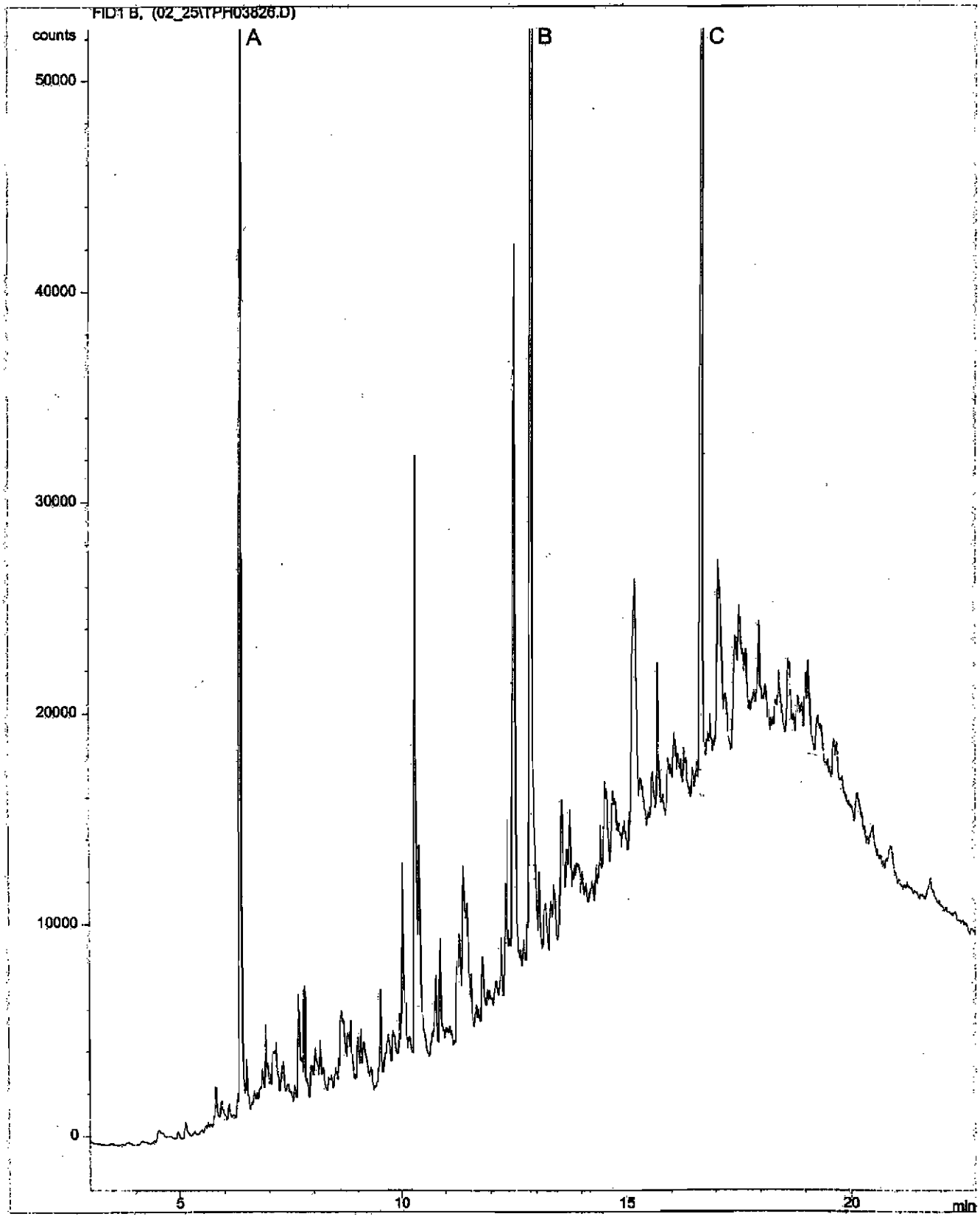
GEOCHEM ANALYTICAL SERVICES
Diesel Range Organics Analysis
By G.C.

6274-007



GEOCHEM ANALYTICAL SERVICES
Diesel Range Organics Analysis
By G.C.

6274-008



Quantitation Report

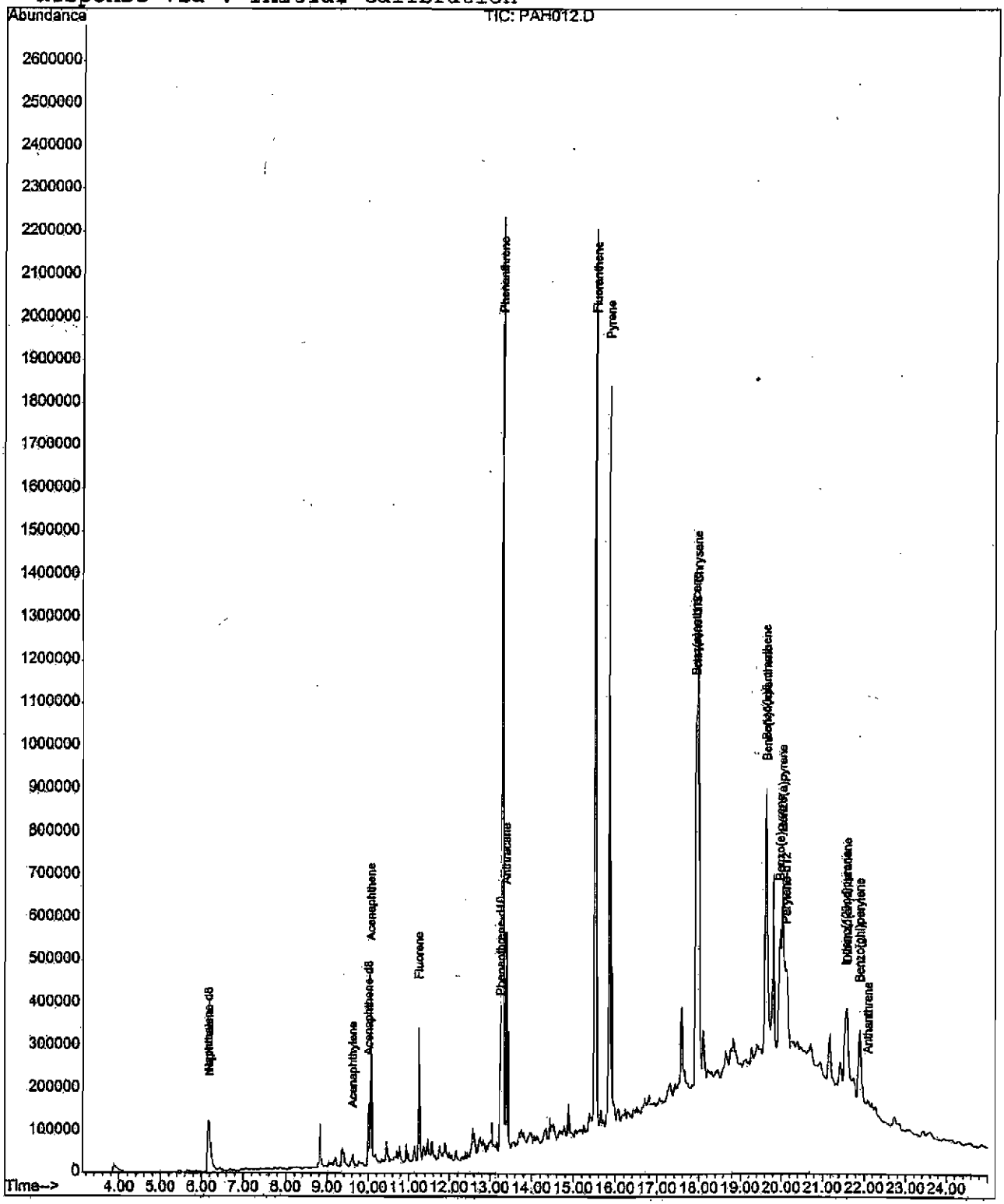
Data File : C:\HPCHEM\1\DATA\062402\PAH012.D
Acq On : 24 Jun 2002 23:30
Sample : 200206274-004/S2/D1 1.0-1.25
Misc : Wardell Armstrong/Soil

Vial: 11
Operator: Alcontrol
Inst : 99 5973
Multiplr: 2.50
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jun 25 18:14 2002

Quant Results File: DPAH19.RES

Method : C:\HPCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jun 25 10:31:15 2002
Response via : Initial Calibration



Quantitation Report

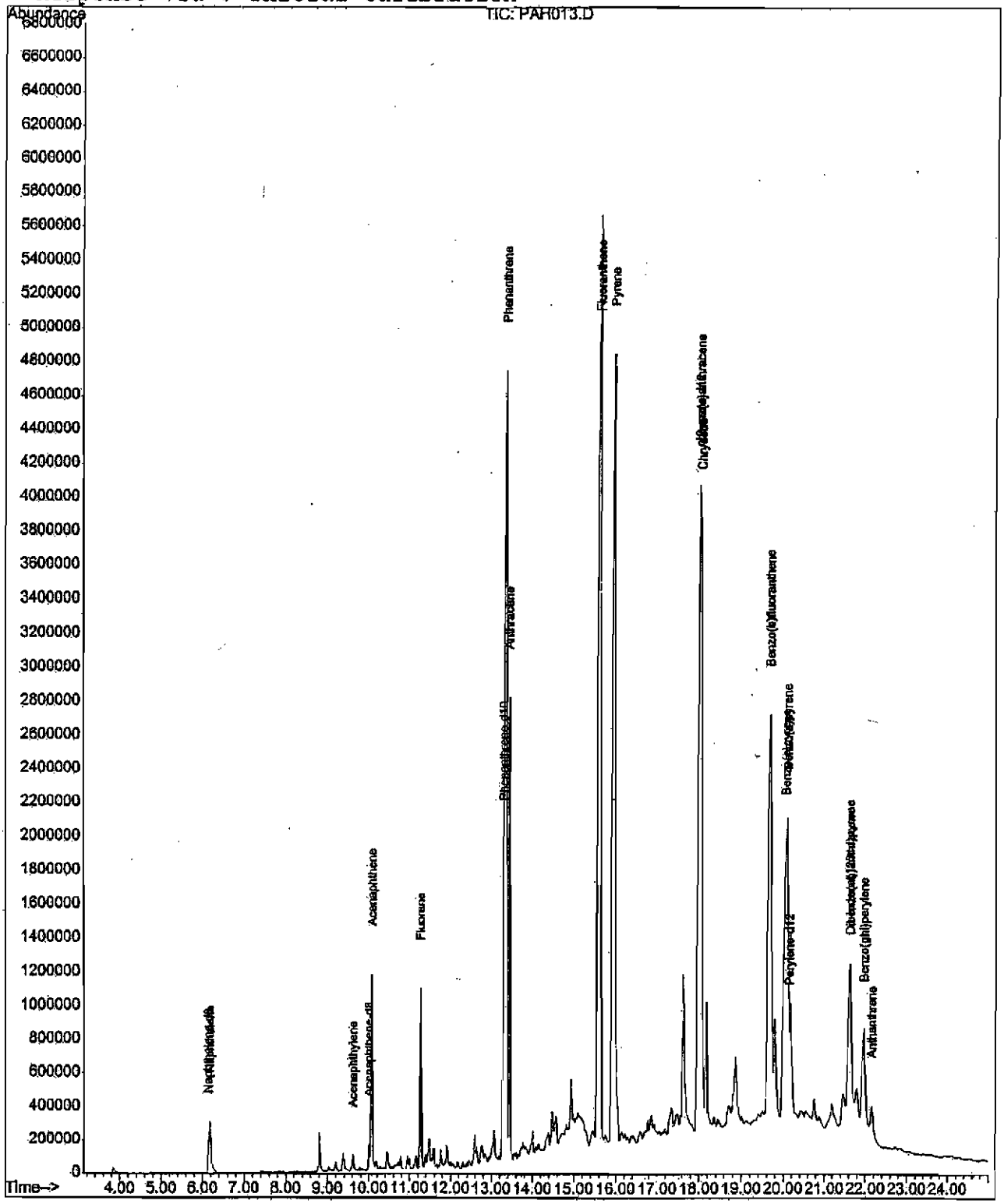
Data File : C:\HPCHEM\1\DATA\062402\PAH013.D
Acq On : 25 Jun 2002 00:05
Sample : 200206274-008/S3/D1 2.5-3.0
Misc : Wardell Armstrong/Soil

Vial: 12
Operator: Alcontrol
Inst : 99 5973
Multiplr: 0.50
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jun 25 18:16 2002

Quant Results File: DPAH19.RES

Method : C:\HPCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jun 25 10:31:15 2002
Response via : Initial Calibration



Quantitation Report

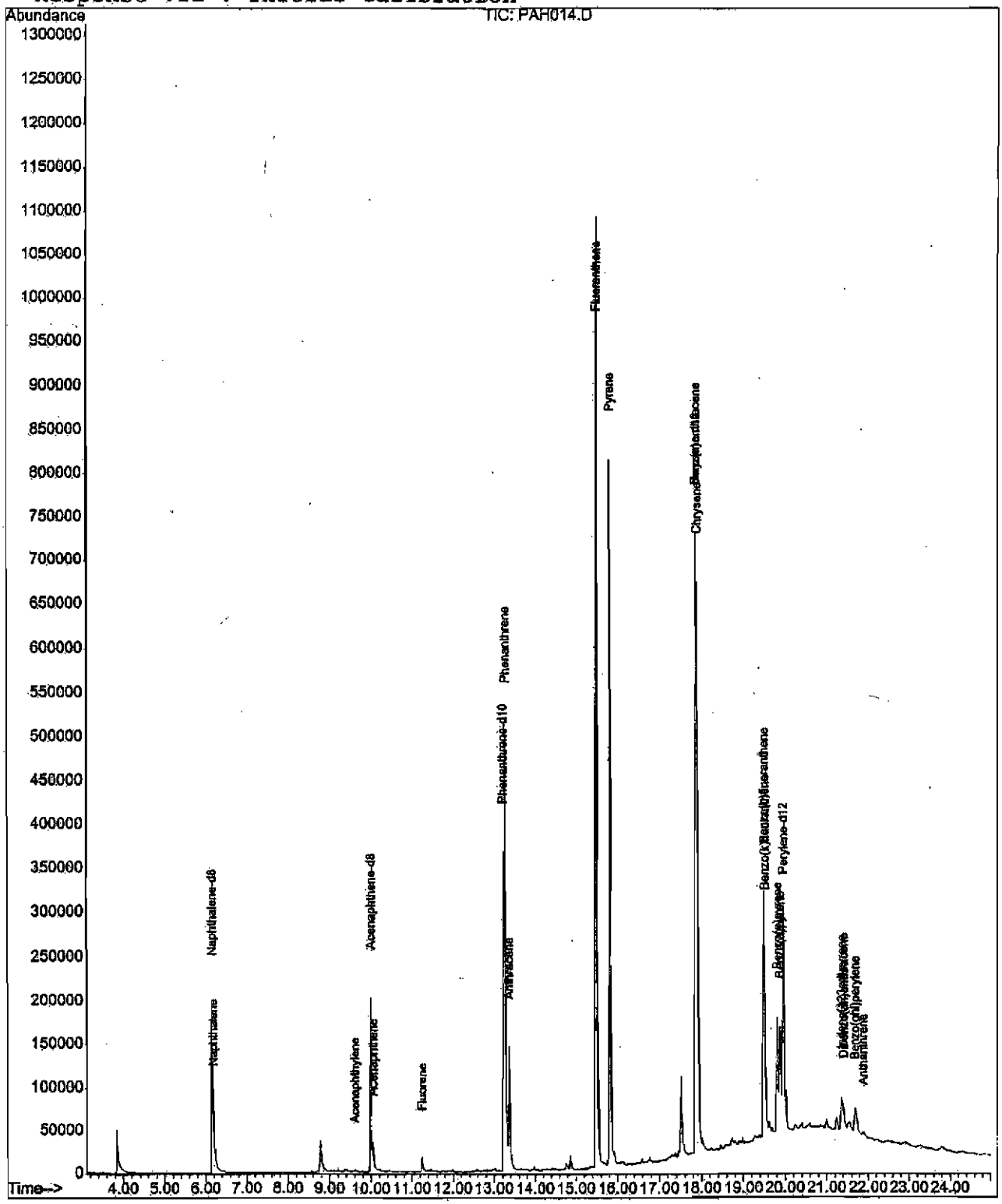
Data File : C:\HPCHEM\1\DATA\062402\PAH014.D
Acq On : 25 Jun 2002 00:40
Sample : 200206274-012/S5/D1 1.7-1.9
Misc : Wardell Armstrong/Soil

Vial: 13
Operator: Alcontrol
Inst : 99 5973
Multiplr: 0.50
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jun 25 18:18 2002

Quant Results File: DPAH19.RES

Method : C:\HPCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jun 25 10:31:15 2002
Response via : Initial Calibration





Based upon Ordnance Survey maps with the sanction of the controller of H.M. Stationary Office
Crown Copyright Reserved Licence No ES758914

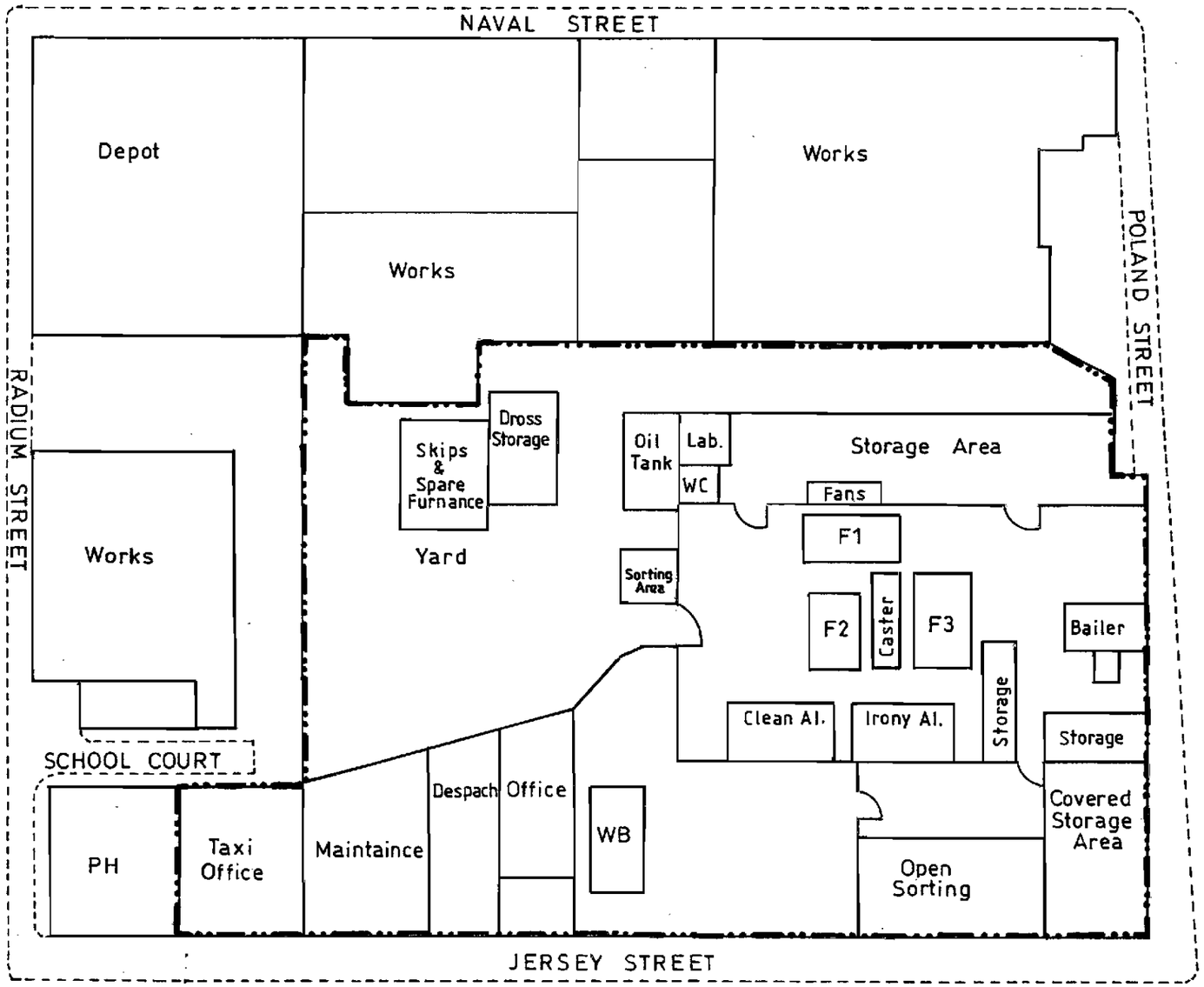
© *Copyright Reserved*

CLIENT	DRG No	SCALE	DATE
BILL HOWARTH METALS	LE02660/001	1:25,000	JULY 2002
PROJECT	**DRAWN BY**	**CHECKED BY**	**APPROVED BY**
JERSEY STREET MANCHESTER	B.P.S.		
DRAWING TITLE			
SITE LOCATION			

Wardell Armstrong
Engineering & Environmental Solutions

LHA001

Site Layout Plan



REFERENCE

Site boundary.....

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

Bill Howarth Metals.

PROJECT

109 Jersey Street.

DRAWING TITLE

Site Layout Plan.

DRG No	SCALE	DATE
LE 02660/002	Not to Scale	July 2002
DRAWN BY: Ursula Levy	CHECKED BY	APPROVED BY

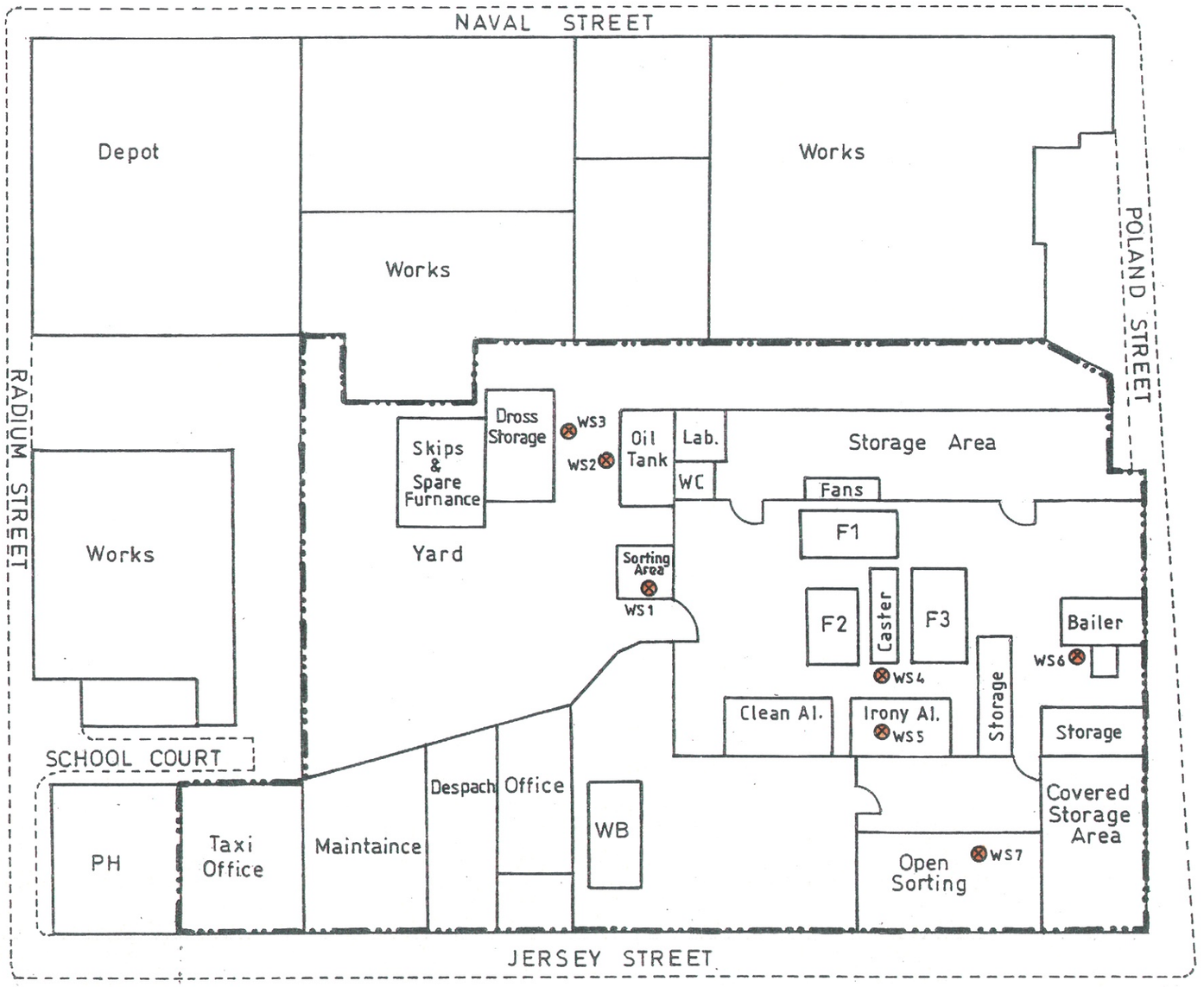
☐ NEWCASTLE-UNDER-LYME (HEAD OFFICE) TEL 01782 612626
☐ NEWCASTLE UPON TYNE TEL 0191 232 0943
☐ WEST BROMWICH TEL 0121 580 0909
☐ LONDON TEL 020 7267 2872
☐ CARDIFF TEL 029 2038 2485
■ LEIGH TEL 01942 260101
☐ SHEFFIELD TEL 0114 245 6244

Wardell Armstrong
Engineering & Environmental Solutions

Based upon Ordnance Survey maps with the sanction of the controller of H.M. Stationary Office
Crown Copyright Reserved Licence No ES758814

© Copyright Reserved

Site Layout Plan



REFERENCE

Site boundary.....

Sample location..... ⊗ WS1

Furnance..... F

Weigh bridge..... WB

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

Bill Howarth Metals.

PROJECT

109 Jersey Street.

DRAWING TITLE

Sample Locations Plan.

DRG No	SCALE	DATE
LE 02660/003	Not to Scale	July 2002
DRAWN BY: Ursula Levy	CHECKED BY: CB	APPROVED BY:

☐ NEWCASTLE-UNDER-LYME (HEAD OFFICE)	TEL 01782 612626	☐ CARDIFF	TEL 029 2038 2485
☐ NEWCASTLE UPON TYNE	TEL 0191 232 0943	■ LEIGH	TEL 01942 260101
☐ WEST BROMWICH	TEL 0121 580 0909	☐ SHEFFIELD	TEL 0114 245 6244
☐ LONDON	TEL 020 7287 2872		

Wardell Armstrong
Engineering & Environmental Solutions

© Copyright Reserved

Based upon Ordnance Survey maps with the sanction of the controller of H.M. Stationary Office
Crown Copyright Reserved Licence No 62756814