

National Grid Property Holdings Limited
Ford Road, Arundel (Site No. 2551)

Detailed Quantitative Risk Assessment Report

Final Report

October 2012

National Grid Property Holdings Limited

Ford Road, Arundel

Site Location Code: 2551

Detailed Quantitative Risk Assessment Report

Final [REDACTED] Report

October 2012

Notice

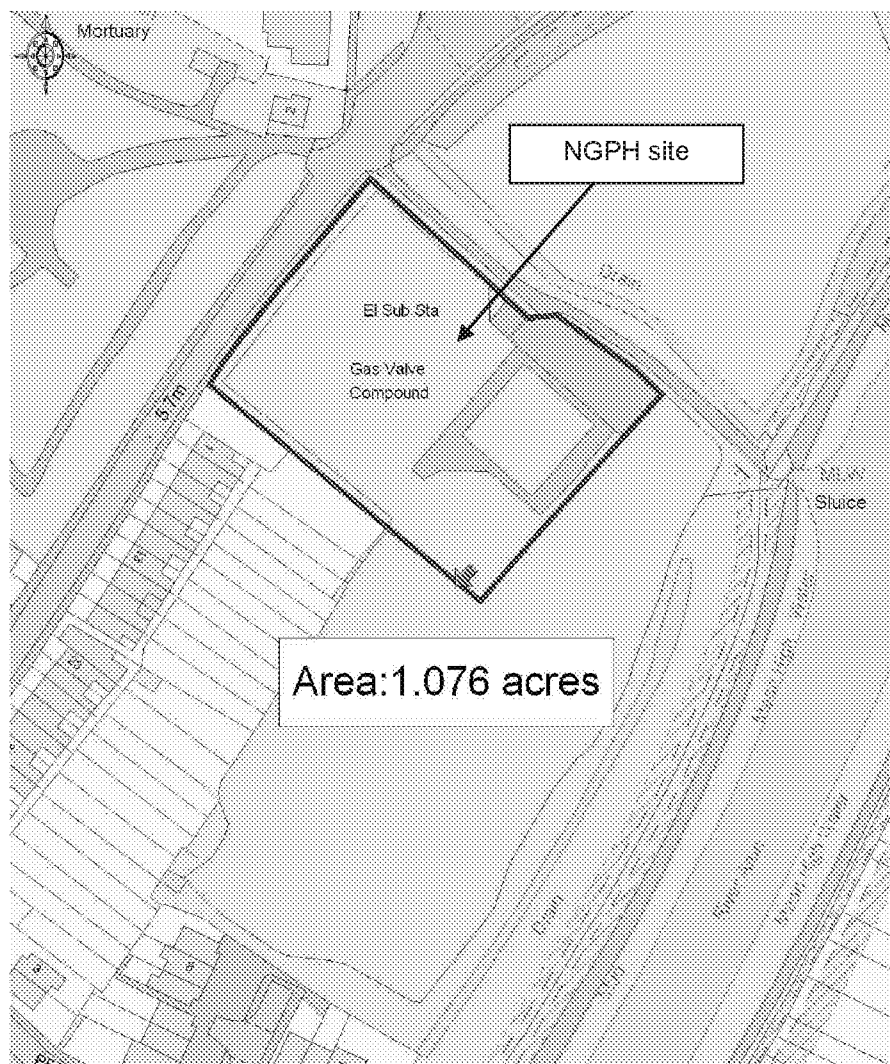
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Appendix A Vapour Sampling Analytical Results

A horizontal bar chart titled 'U.S. should take action to address climate change' showing the percentage of respondents who believe the U.S. should take action to address climate change. The chart is broken down by age group (18-29, 30-49, 50-69, 70+) and gender (Male, Female). The y-axis lists the demographic groups, and the x-axis shows the percentage from 0 to 100. The bars are color-coded: blue for Male and orange for Female. The data is as follows:

Age Group	Gender	
18-29	Male	85%
	Female	88%
30-49	Male	78%
	Female	82%
50-69	Male	65%
	Female	70%
70+	Male	55%
	Female	60%

Glossary of Terms

Term	Meaning / Definition
aOD	above Ordnance Datum
AQO	Air Quality Objective
ATD	atomic thermal desorption
Atkins	Atkins Limited
bgl	below ground level
BGS	British Geological Survey
BTEX	benzene, toluene, ethylbenzene and xylene
CLEA	Contaminated Land Exposure Assessment
CoC	constituent of concern
CSM	conceptual site model
DQRA	detailed quantitative risk assessment
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
f_{oc}	fraction of organic carbon
GAC	generic assessment criterion
GQRA	generic quantitative risk assessment
ha	hectare(s)
Kd	soil-water partitioning coefficient
Koc	organic carbon-water partitioning coefficient
MDL	method detection limit
MORECS	Met Office Rainfall and Evaporation Calculation System
NAPL	non-aqueous phase liquid
NGPH	National Grid Property Holdings Limited
OS	Ordnance Survey
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
PID	photoionisation detector
PORT	prioritisation of risk tool
ppb	parts per billion
PPL	potential pollutant linkage
ppm	parts per million
SGV	Soil Guideline Value
SOM	soil organic matter
SPZ	Source Protection Zone
SR	Science Report
SSAC	site specific acceptance criterion
$t_{1/2}$	half life
TIC	tentatively identified compound
TPH CWG	Total Petroleum Hydrocarbons Criteria Working Group
UKRfC	UK Reference Concentration
VOC	volatile organic compound
WQS	water quality standard
WSV	water screening value

Introduction

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1. Introduction

1.1 General

Following a supplementary environmental investigation [REDACTED] report prepared by Atkins Limited (Atkins) in October 2011 (Ref. 1), Atkins was commissioned by National Grid Property Holdings Limited (NGPH) to undertake a detailed quantitative risk assessment (DQRA) for their site located at Ford Road, Arundel. The site comprises a former gasworks and is centred on Ordnance Survey (OS) Grid Reference 501308E, 106749N; a site location plan is presented as Figure 1.

1.2 Background

The site was operated as a gasworks from at least 1840 until the late 20th century. Investigation and assessment works conducted to date (summarised in Section 2.5) h [REDACTED]

[REDACTED] in June 2010 NGPH commissioned Atkins to undertake a supplementary phase intrusive site investigation [REDACTED]

1.3 Previous Reports

The following historical reports pertaining to the site have been made available and utilised, where appropriate, as part of this assessment:

- Harrison and Company, 1993. Desk Study on a Disused Gas Work at Ford Road, Arundel, West Sussex for British Gas (South Eastern) plc. Ref. C604A (Ref. 3);
- Atkins Limited, April 1994. British Gas Environmental Liability Assessment Report. Ref. E5347/LR860.NL/gp (Ref. 4);
- Atkins Limited, December 2000. Environmental Assessment Site Investigation, Final [REDACTED] Report. Ref. A71430/GTG.2000078/R002rev1/December2000 (Ref. 2); and
- Atkins Limited, October 2011. Land Contamination Site Investigation [REDACTED] Ref. 5104362/GTG.20100923/Arundel 2011/R001v0 (Ref. 1).

A site investigation was also undertaken by Harrison and Co. in 1988; however, Atkins has not reviewed this report. A summary of the investigation is provided within the Harrison and Co. 1993 desk study (Ref. 3) and only this information has been reviewed.

1.4 Scope and Objectives

• [REDACTED]

■ [REDACTED]

In summary, the scope of this assessment comprises the following:

- undertake further vapour monitoring from soil vapour wells and ambient air to assess the [REDACTED];
- [REDACTED];
- [REDACTED];
- [REDACTED];

1.5 Assumptions and Limitations

This DQRA has been undertaken based on the current understanding of the present site conditions, as derived through intrusive site investigation in combination with literature research. Whilst it is considered that the site has been adequately characterised by these works, there is still the potential for localised areas of unidentified contamination to be present on site between the exploratory holes which may alter the outcome of this assessment. Further assumptions and limitations include:

- geology by its very nature is both laterally and vertically variable and could be dissimilar from that identified by the exploratory holes;
- details from previous site investigations, undertaken by third parties, have been incorporated into this report. These details have been assumed to be correct for the purposes of this assessment;
- this assessment has been made considerate of the current ground conditions and cover, with the exception that it assumes that under an open storage land use all vegetation would be cleared (the site is currently heavily overgrown);
- this assessment has been made considerate of the current ground levels and assumes that no major changes in ground level will be made (e.g. no levelling of the raised areas in the southern and south eastern portions of the site);

- [REDACTED]

... [REDACTED]

... [REDACTED]

... vapour sampling results are dependent on the conditions during the sampling. Temperature, tidal effects and atmospheric pressure may affect the soil vapour concentrations, although studies indicate this variation is less than one order of magnitude. Weather conditions may also affect the ambient air sampling.

- [REDACTED]

... t [REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]

Atkins has not engaged with any regulators (i.e. the Environment Agency or Local Authority), and it is not envisaged that at this stage any discussions will be initiated. It should be noted, however, that stakeholder engagement is likely to constitute a fundamental part of any future work.

2. Site Status, History and Environmental Setting

2.1 Introduction

The site status, history and environmental setting have previously been discussed within Atkins' Site Investigation a [REDACTED] report (Ref. 1). A brief summary is presented below, however, for more detailed information please refer to the aforementioned report.

2.2 Site Status

2.2.1 Location

The site is located on Ford Road, Arundel, West Sussex, BN18 9DX at National Grid Reference No. TQ013067 (OS Grid Reference 501308E, 106749N) and covers an area of approximately 0.4 hectares (ha). Figure 1 presents a site location plan, and Figure 2 presents a site layout plan including historical site features.

2.2.2 Site Layout

The site is generally flat and set into the side of a gently sloping hill, with the surrounding land sloping from north west to south east. An electricity sub-station is located on the eastern site boundary adjacent to the site entrance and concrete slab foundations are located in the northern and eastern corners of the site. No other above ground structures or buildings are present on the site. A raised spoil heap and raised rectangular area (identified on the historical plans to have formerly been the location of a governor compound) are located in the southern and south eastern portions of the site, respectively.

During the most recent site investigation the site was recorded as comprising approximately 25 % tarmac, with the remainder comprising of either gravel, wood chippings or bare earth which were heavily overgrown with shrubs (e.g. buddleia), semi-mature trees and brambles.

The site boundary comprises a 2 m high chain link fence in reasonable condition. Access to the site is gained via 2 m high chain-link padlocked double gates located along an access track adjacent to the north eastern boundary of the site (off Ford Road).

The surrounding land uses are as follows:

- to the south west are residential houses with gardens;
- to the south east is private grazing land. The River Arun is located beyond the private grazing land, approximately 40 m from the site boundary, and flows towards the south east (although is tidally influenced);
- to the north west is Ford Road, beyond which is a cemetery with a building (assumed residential); and
- to the north east is an access track leading off Ford Road, beyond which is a small surface water drain (which runs towards the River Arun via a sluice gate), and private grazing land.

2.3 Site History

Historical maps have been obtained for the site and identify the gasworks to have been present from before 1840, expanding in the west in circa 1899, and in the south and south east in circa 1937. Figure 2 summarises the on-site potentially contaminative land uses identified from a review of historical maps; for the full assessment please refer to Atkins' Site Investigation and Generic Quantitative Risk Assessment report (Ref. 1).

2.4 Environmental Setting

2.4.1 Geology

Table 2.1 summarises the geology beneath the site based upon published geology (British Geological Survey (BGS) Sheet 317, Chichester (Ref. 6)) and the results of intrusive investigations.

Table 2.1 - Summary of Published and Previously Identified Geology

Strata	Proven Thickness (m)	Description	Additional Detail
Made Ground	0.0 to 3.0*	Variable across the site, but generally comprised firm, sandy, gravelly clay and fine to medium, gravelly, clayey sand with frequent brick, chalk and flint gravels and fragments of clinker, coal and metal.	Greatest depths in the areas that were recorded to be formerly occupied by gas holders and pipes.
Alluvium	0.7 to 6.3	Stiff, silty, very gravelly clay or clayey gravel.	-
Chalk (Spetisbury Chalk)	>3.8 to >7.6	Structureless fine chalk composed of gravels and chalk cobbles in a soft off-white/grey clay matrix.	Base not proven.

Note: * Maximum thickness of Made Ground identified during the Harrison and Co. site investigation in 1988, detailed within their 1993 desk study report (Ref. 3). Exact details of where this thickness of Made Ground was identified are not reported. The maximum proved thickness of Made Ground identified during Atkins' site investigations is 2.7 m, located at BH101 in the north of the site.

2.4.1.1 Indications of Potential Contamination (Visual and Olfactory Observations)

A number of visual and olfactory indicators of potential contamination have been identified in the Made Ground, Alluvium and Chalk during intrusive investigation undertaken to date. These are summarised in Table 2.2, which includes preliminary screening for volatile organic compound (VOC) vapours undertaken using a photoionisation detector (PID) (MiniRAE 2000 VOC detector). Figure 3 presents a plan identifying the spatial distribution of visual and olfactory evidence of hydrocarbon contamination across the site.

Specific details of any visual and/or olfactory evidence of contamination identified during the Harrison and Co. site investigation in 1988 are not provided within their desk study report (Ref. 3), and therefore these details are absent from Table 2.2.

Table 2.2 - Visual and Olfactory Observations and PID Readings

Location	Strata	Depth (m bgl)	Visual/Olfactory Observation	Max VOCs (ppm)
BH1	CHK	6.5-10.0	Occasional dark grey staining and slight odour (type not specified).	-
BH3	MG	0.0-0.6	Odour (type not specified).	-
	ALV	3.2	Odour (type not specified).	-
		4.3	Slight odour (type not specified).	-
BH5	CHK	6.0-10.0	Hydrocarbon odour.	-
TP2	MG	1.5-2.2	Foul lime, black staining, pockets of tar, phenol odour.	-
		1.8	Tar stained gravel.	-
	N/A	1.8	Dark brown water with a brown foam and tar odour.	-
TP5	MG	0.1-1.0	Ash and a pocket of tar contaminated soil.	-
		1.0-1.7	Heavy tar contamination.	-
	ALV	1.7-2.0	Tar contamination.	-
	N/A	1.2	Tar contaminated water with sheen contained within a buried pipe.	-
TP7	MG	0.1-1.2	White ash.	-
TP8	MG	0.1-0.95	Ash, clinker and spent oxide.	-
	N/A	1.2	Dark brown/green water with a phenol/oil odour and sheen contained within a buried pipe.	-
TP10A	MG	0.1-1.9	Ash.	-
TP14	MG	0.1-1.0	Ash, clinker and a slight gasworks odour.	-
TT2A	MG	0.0-1.9	Ash.	-
		1.8	Anaerobic odour and black staining.	-
TT2B	MG	1.0-1.1	Anaerobic odour and black staining.	-
BH101	MG	0.0-1.2	Clinker.	-
	ALV	1.5-2.7	Black mottling and occasional pockets of saturated black tar. Faint hydrocarbon odour from 1.5-1.8 m bgl. Strong hydrocarbon odour from 1.8-2.7 m bgl.	-
	ALV	2.8-3.4	Dark grey/black clay and gravels with strong hydrocarbon odour and saturated with free product.	-
	CHK	3.4-7.5	Pockets of free phase product and black mottling with a moderate to slight hydrocarbon odour.	-
	CHK	7.5-11.0	Slight hydrocarbon odour.	-
BH103	MG	0.0-0.5	Clinker.	-
BH105	MG	0.3-2.0	Clinker.	-
BH104	MG	0.0-1.8	Clinker.	-

Location	Strata	Depth (m bgl)	Visual/Olfactory Observation	Max VOCs (ppm)
	MG	3.5-3.65	Faint hydrocarbon odour.	-
TP101	MG	0.0-0.4	Clinker.	0.1
	MG	0.4-0.6	Black ash and clinker.	0.1
	MG	0.6-0.9	Occasional clinker.	-
TP102	MG	0.0-0.3	Clinker.	-
TP103	MG	0.0-0.8	Clinker.	0.2
TP104	MG	0.0-0.5	Occasional clinker.	<0.1
TP105	MG	0.9-1.3	Clinker gravels and black ash.	0.1
TP106	MG	0.0-0.95	Clinker.	0.3
TP108A	MG	0.0-1.2	Clinker.	0.2
TP108B	MG	0.9-2.5	Occasional clinker. Slight hydrocarbon odour from 1.4-1.9 m bgl. Strong hydrocarbon odour from 1.9-2.5 m bgl. Black, hydrocarbon saturated soil from 1.9 m bgl.	0.6
TP109A	MG	0.0-0.8	Clinker. Black stained flints and faint hydrocarbon odour from 0.4-0.8 m bgl.	1.9
TP109B	MG	0.0-1.6	Clinker.	0.0
TP110	MG	0.2-0.5	Clinker.	0.2
TP111	MG	0.2-1.1	Clinker and solidified tar fragments.	0.7
	MG/ ALV	1.1-2.0	Clinker and saturated tarry soils. Moderate tar odour from 1.3 m bgl. Strong tar odour from 1.4 m bgl. Slight hydrocarbon/tar odour and occasional black staining from 1.6-2.0 m bgl.	12.7
TP112	MG	0.0-0.2	Clinker.	-
	MG	0.7-0.75	Band of black solidified tar and clinker.	-
TP113	MG	0.0-1.0	Clinker.	2.4
	ALV	1.25-2.3	Pockets of hydrocarbon saturated tarry clay. Strong hydrocarbon/tarry odour.	18.2
TP115	MG	0.9-2.0	Clinker.	0.1
VP200A	MG	0.0-0.3	Solidified tar.	-
VP201	MG	0.0-0.25	Clinker.	-
VP202	MG	0.0-1.0	Clinker.	0.2
VP203C	MG	0.1-0.6	Clinker.	0.2
VP204	MG	0.0-0.3	Clinker.	0.2
	MG	0.85-1.3	Fragments of solidified tar.	0.6

Notes: bgl – below ground level; ppm – parts per million; “-” PID reading not taken; MG – Made Ground; ALV – Alluvium; CHK – Chalk; N/A – not applicable.

[REDACTED]

Evidence of asbestos has not been visually identified during any of the site investigations undertaken to date, and asbestos has not been positively identified within any of the soil samples submitted for analysis.

2.4.2 Hydrogeology

2.4.2.1 Regional

The Environment Agency designation for the Alluvium beneath the site is as a Secondary (A) Aquifer and the Chalk is designated as a Principal Aquifer (Ref. 7). The Environment Agency website (Ref. 7) indicates that the site does not lie within a Source Protection Zone (SPZ). The closest SPZ (Inner Zone) is located approximately 0.8 km to the north west of the site.

An Envirocheck report (Ref. 8) for the site identifies one groundwater abstraction within 1 km of the site, located approximately 0.774 km to the north west.

2.4.2.2 Site Specific

During the two site investigations undertaken by Atkins (in 2000 (Ref. 2) and 2011 (Ref. 1)), groundwater was encountered during excavation in a number of exploratory locations within the Made Ground (TP1 and TP2), Alluvium (BH1, BH2, BH3, BH4, TP11A, TP12, BH104, TP102, TP106 and TP112) and Chalk (BH101).

Boreholes installed during the 2000 site investigation (BH1 to BH5, which had been decommissioned before the start of the 2011 site investigation) were all installed with screened sections within the Chalk. Boreholes BH101D and BH102 to BH105 drilled during the 2011 site investigation were also installed with screened sections within the Chalk. BH101S was installed with a screened section across the Made Ground and Alluvium where visual and olfactory evidence of contamination was identified.

Monitoring of the shallow installation screened across the Made Ground and deep installation screened in the Chalk in BH101 indicates a difference in the measured groundwater levels in the Alluvium / Made Ground and the Chalk of 0.24 m. The groundwater in the Chalk was also observed to rise by 1.4 m following the initial strike, [REDACTED]

Continuous groundwater level monitoring was conducted as part of the Atkins 2011 investigation in three boreholes (BH101D, BH104 and BH105) with response zones in the Chalk. One set of groundwater levels measured at high tide (at 00:34 on 15 July 2011) and one at low tide (at 19:24 on 7 July 2011) are presented in Table 2.3. Figures 4a and 4b present groundwater contour plots inferred from the groundwater monitoring data for high tide and low tide, respectively. Groundwater flow at high tide is towards the west/north west, with a reversal in flow direction during low tide (flowing in a south easterly direction towards the River Arun). There is approximately 12.5 hours between peak high tides. The tidal monitoring indicates that there is significant tidal variation in the groundwater level at the site (up to approximately 2 m variance).

[REDACTED]

Table 2.3 - Groundwater Monitoring at High and Low Tide

Location	Groundwater Level at High Tide (Metres Above Ordnance Datum (m aOD))	Groundwater Level at Low Tide (m aOD)
BH101D	1.937	0.363
BH104	2.003	-0.034
BH105	2.078	0.030

2.4.3 Hydrology

The River Arun is located approximately 40 m south east of the site, adjacent to the grazing land. The river is tidally influenced in the local area and generally flows in a southerly direction, towards the English Channel, with reversal of flow during high tide. A drainage ditch is located approximately 5.0 m from the north eastern site boundary and flows in a south easterly direction discharging into the River Arun via a sluice gate.

2.5 Previous Site Investigations and Assessments

2.5.1 Harrison and Co., 1988: Site Investigation

The site investigation undertaken by Harrison and Co. in 1988 is summarised within their desk study report (Ref. 3) and comprised 22 trial pits across the site and the grazing field adjacent to the south of the site.

Within the current site boundary, buried structures including concrete, pipes and metalwork were encountered within the Made Ground, found to be approximately 1.3 m in thickness but ranging up to 3.0 m.

[REDACTED]

2.5.2 Atkins, 2000: Site Investigation

In 2000, Atkins undertook an intrusive investigation at the site with the findings reported in the Atkins Environmental Assessment Site Investigation Report (Ref. 2). Atkins' site investigation comprised:

- five groundwater monitoring wells installed within the Chalk Aquifer numbered BH1 to BH5;
- excavation of two trial trenches numbered TT1 and TT2;
- excavation of 14 trial pits numbered TP1 to TP14;
- one round of surface water sampling from the drainage ditch adjacent to the site; and
- one round of groundwater dipping and sampling.

[REDACTED]

[REDACTED]

2.5.3 Atkins, 2011: Site Investigation [REDACTED]

[REDACTED]

In 2011, Atkins undertook the following physical investigations:

- five hand dug/augered pits numbered VP200 to VP204 installed as vapour monitoring wells;
- 15 No. trial pits numbered TP101 to TP115;
- five boreholes numbered BH101 to BH105 installed as groundwater monitoring wells;
- one round of surface water sampling from the drainage ditch adjacent to the site;
- two rounds of soil vapour sampling and groundwater dipping and sampling; and
- permeability testing and tidal monitoring.

2.5.3.1 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] indicating that potential unacceptable risks to both the on

[REDACTED]

2.5.3.2

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

3.

3.2

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T [REDACTED]

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- [REDACTED]
- [REDACTED]

[REDACTED]

3.4

[REDACTED]

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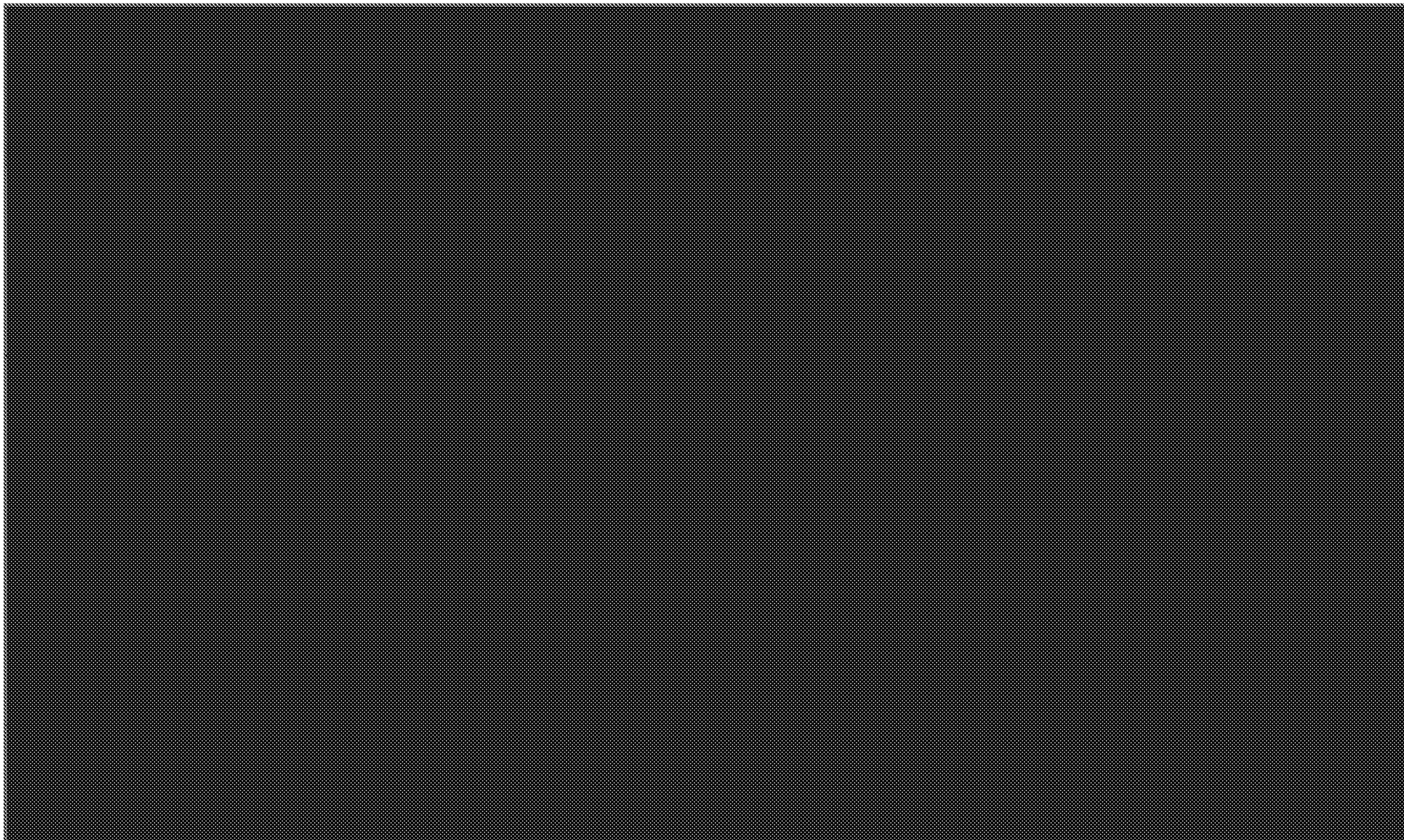
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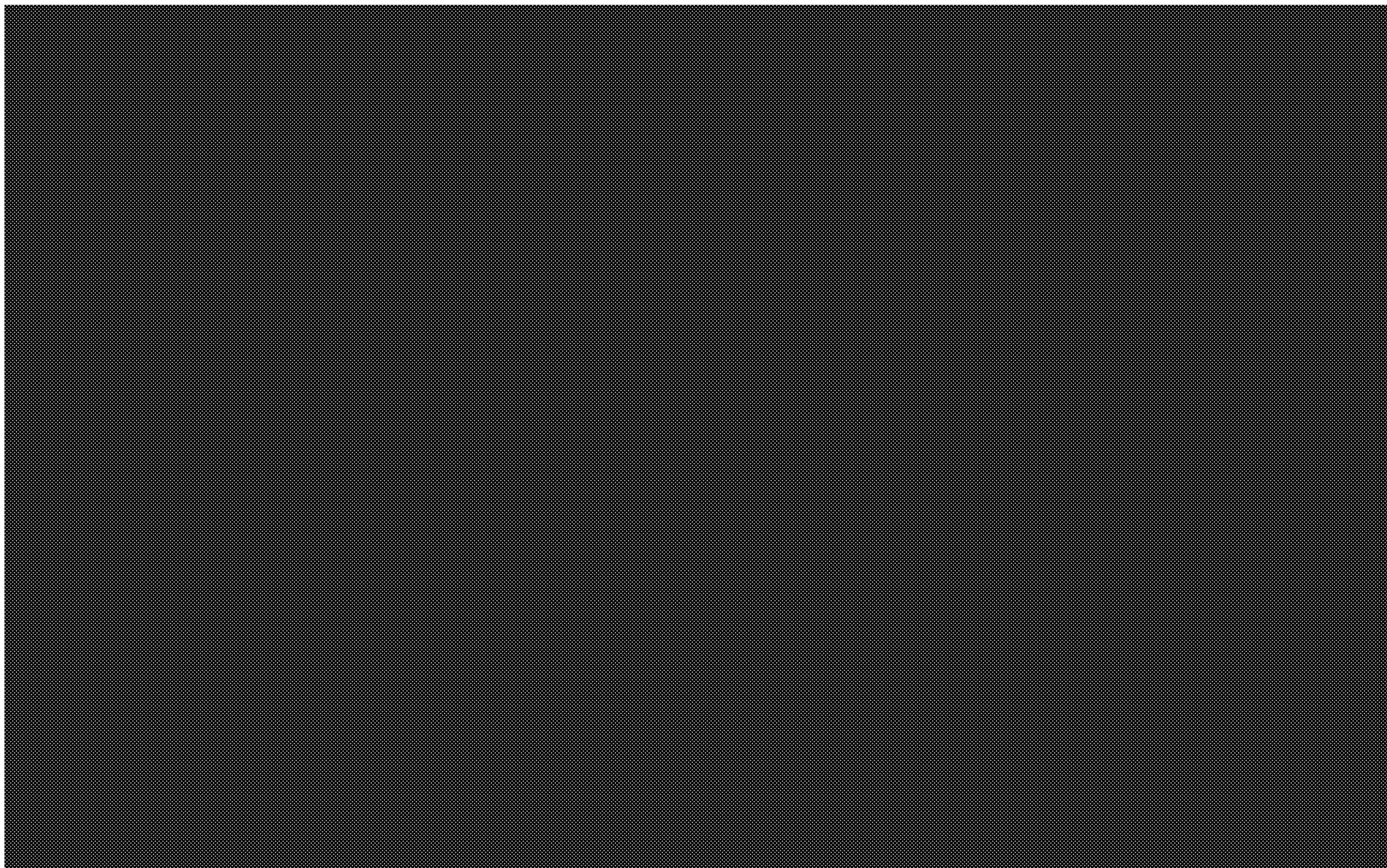
Table 3.1 - Potential Pollutant Linkages Post-QGRA

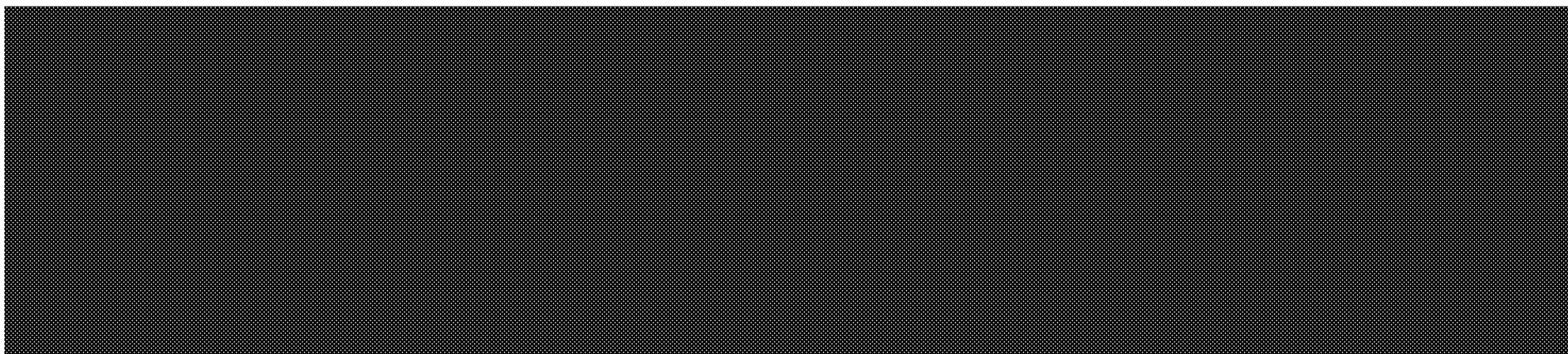












4. Atkins' 2012 Site Works

4.1 Introduction

Following the [REDACTED] 2011 site investigation, and a meeting dated 04 November 2011 with NGPH, Atkins undertook additional vapour monitoring at the site [REDACTED].

The scope of works and methodology is discussed within this section of the report, with the results and assessment discussed in Section 5.

4.2 Scope of Works

[REDACTED] additional vapour monitoring was undertaken in February 2012. The sampling comprised:

- repeat soil vapour sampling from three soil vapour wells installed during the 2011 site investigation, with analysis for TPH Criteria Working Group (CWG) and VOCs (one sampling round). This sampling was undertaken to coincide with a rising/high tide;
- seven-day (minimum) passive ambient air sampling along the site boundaries with analysis for BTEX (two sampling rounds);
- eight-hour continuous ambient air sampling using SUMMA canisters and analysis for TPH CWG, VOCs and tentatively identified compounds (TICs) (two sampling rounds); and
- eight-hour continuous semi-quantitative ambient air VOC monitoring using a PID capable of semi-quantitative measurement of total VOCs in parts per billion (ppb) (two rounds).

4.3 Sampling Methodology

4.3.1 Soil Vapour Sampling

In order to supplement the existing vapour data for the site, soil vapour samples were collected on 28 February 2012 from two of the permanent vapour well locations (VP200 and VP202) and from VP201-temp using a temporary vapour probe. [REDACTED]

[REDACTED] Sampling was undertaken during a rising tide to account for any potential increase in vapour flux during this period.

Prior to sampling, the well volume was purged using a gas syringe. A low flow air sampling pump was used to draw a fixed volume of gas through atomic thermal desorption (ATD) tubes, pre-prepared by Chemex Limited (a UKAS accredited laboratory) with 'Tenax' sorbant.

4.3.2 Ambient Air Sampling

4.3.2.1 Passive Sampling

[REDACTED] passive samplers (ATD tubes) were placed on the site boundaries and in the centre of the site for a period of one week on two occasions. The sampling was undertaken to coincide with settled weather conditions.

The two rounds were undertaken on the following dates:

- Round 1: start date 20 February 2012, left for a period of seven days (approximately 168 hours); and
- Round 2: start date 28 February 2012, left for a period of approximately nine days (274.5 hours).

The sampling locations are shown on Figure 6, and generally correspond to the northern, eastern, southern and western site boundaries, with the fifth location being roughly the centre of the site.

4.3.2.2 Continuous Ambient Air Sampling – SUMMA Canisters

Prior to the sampling undertaken in 2012, vapour monitoring of ambient air had only been conducted on one occasion over a five minute period. It was therefore recommended that ambient air sampling be undertaken over a short to medium term (period of 8 hours) in order to gain an understanding of average conditions.

Sampling was therefore undertaken using SUMMA canisters on two occasions (20 and 28 February 2012) over a period of 8 hours, both sampling rounds targeted to coincide with settled weather conditions. The SUMMA canisters were placed in the same two locations on both rounds:

- Location 1: north west/western corner of the site adjacent to the residential housing; and
- Location 2: north eastern portion of the site in the vicinity of TP5, TP111, TP113 and VP201-temp.

4.3.2.3 Continuous Ambient Air Monitoring – PID

Continuous monitoring was also conducted using a PID, to provide continuous logging during the vapour sampling using SUMMA canisters. The PID was located adjacent to the SUMMA canister at Location 2. No readings above the detection limit of the instrument (0.1 ppb) were recorded during monitoring.

4.3.3 Quality Assurance/Quality Control

A blank Tenax tube sample was analysed for the soil vapour sampling on 28 February 2012 using ATD tubes. The trip blank was analysed as a control sample to identify any cross-contamination in the field. No concentrations greater than the MDL were identified in the trip blank sample. Analytical results are included within Appendix A.

4.4 Laboratory Analysis

Laboratory analytical results are presented in Appendix A and discussed in detail in Section 5.

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[REDACTED]

[REDACTED]



5.2.3 Sampling Data

the vapour sampling rounds undertaken to date are described as detailed in Table 5.1.

Table 5.1 - Vapour Sampling Rounds

Visit	Date	Sample Type	Duration	Sample Type	Location
1	07 July 2011	Pumped soil vapour sampling	~30 minutes/ location	ATD tube	VP200, VP201-temp, VP202, VP203 and VP204
2	15 July 2011	Pumped soil vapour sampling	~30 minutes/ location	ATD tube	VP200, VP201-temp, VP202, VP203, VP204, ambient air (centre of site)
3	20 February 2012	Passive ambient air sampling	7 days	ATD tube	Northern site boundary, southern site boundary, eastern site boundary, western site boundary, centre of site
		Continuous ambient air sampling	8 hours	SUMMA canister	North west/western corner of the site and north eastern portion of the site
		Continuous ambient air monitoring	8 hours	PID (ppb)	North eastern portion of the site
4	28 February 2012	Pumped soil vapour sampling	~30 minutes/ location	ATD tube	VP2000, VP201-temp and VP202
		Passive ambient air sampling	9 days	ATD tube	Northern site boundary, southern site boundary, eastern site boundary, western site boundary, centre of site
		Continuous ambient air sampling	8 hours	SUMMA canister	North west/western corner of the site and north eastern portion of the site
		Continuous ambient air monitoring	8 hours	PID (ppb)	North eastern portion of the site

5.2.4

[REDACTED]

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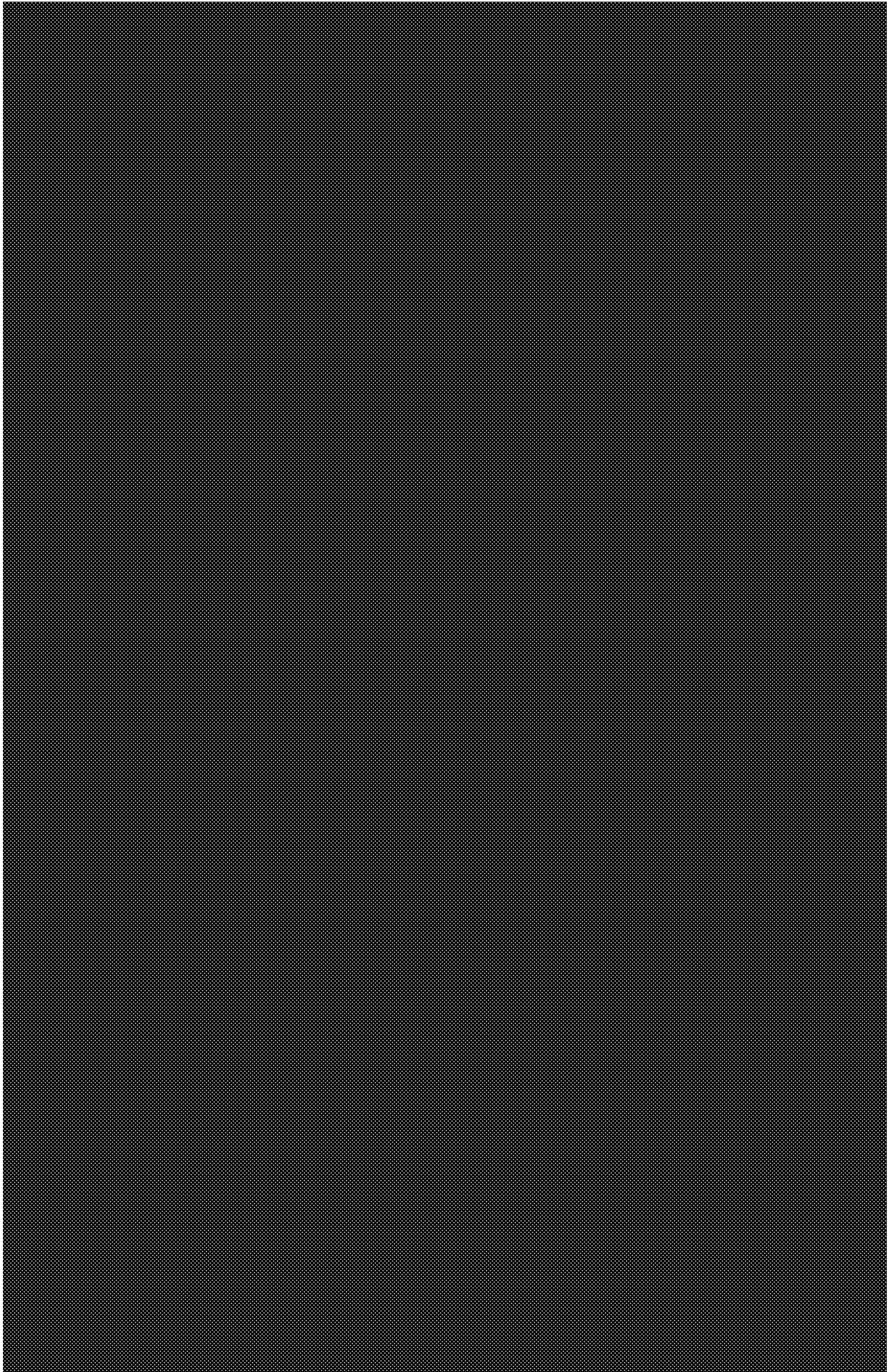
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5.3.2.1

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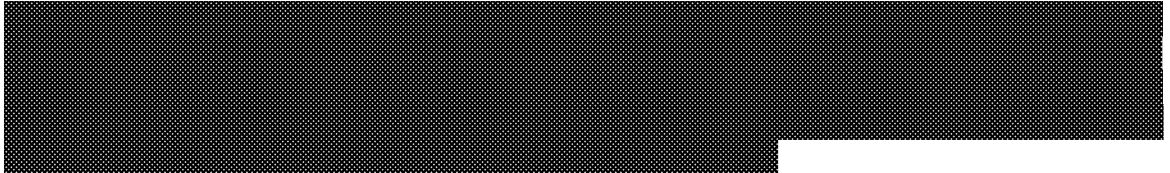
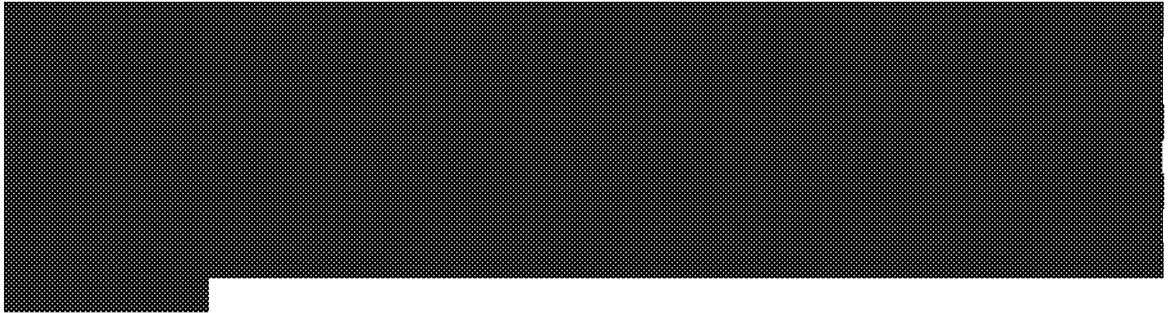
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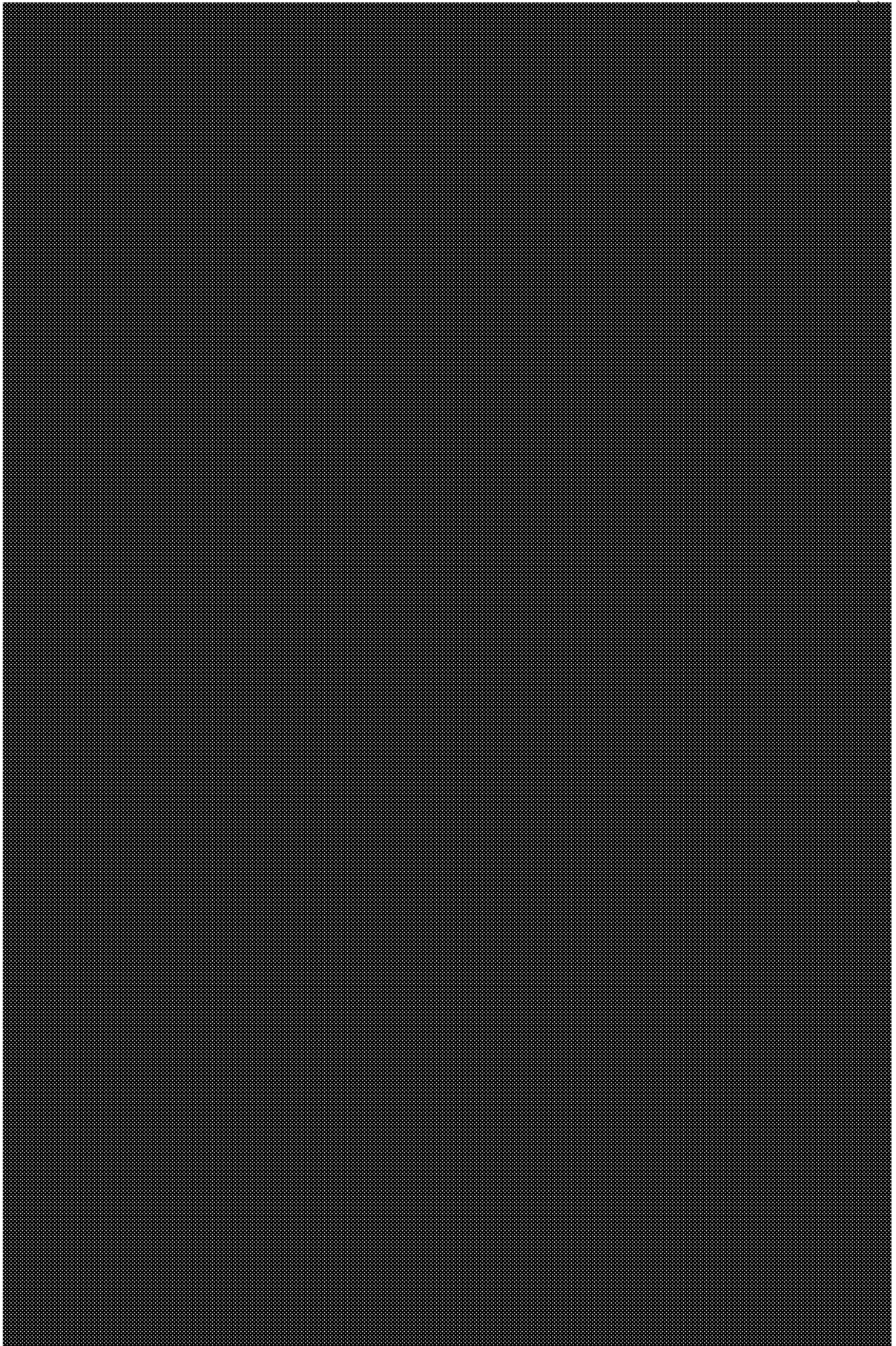
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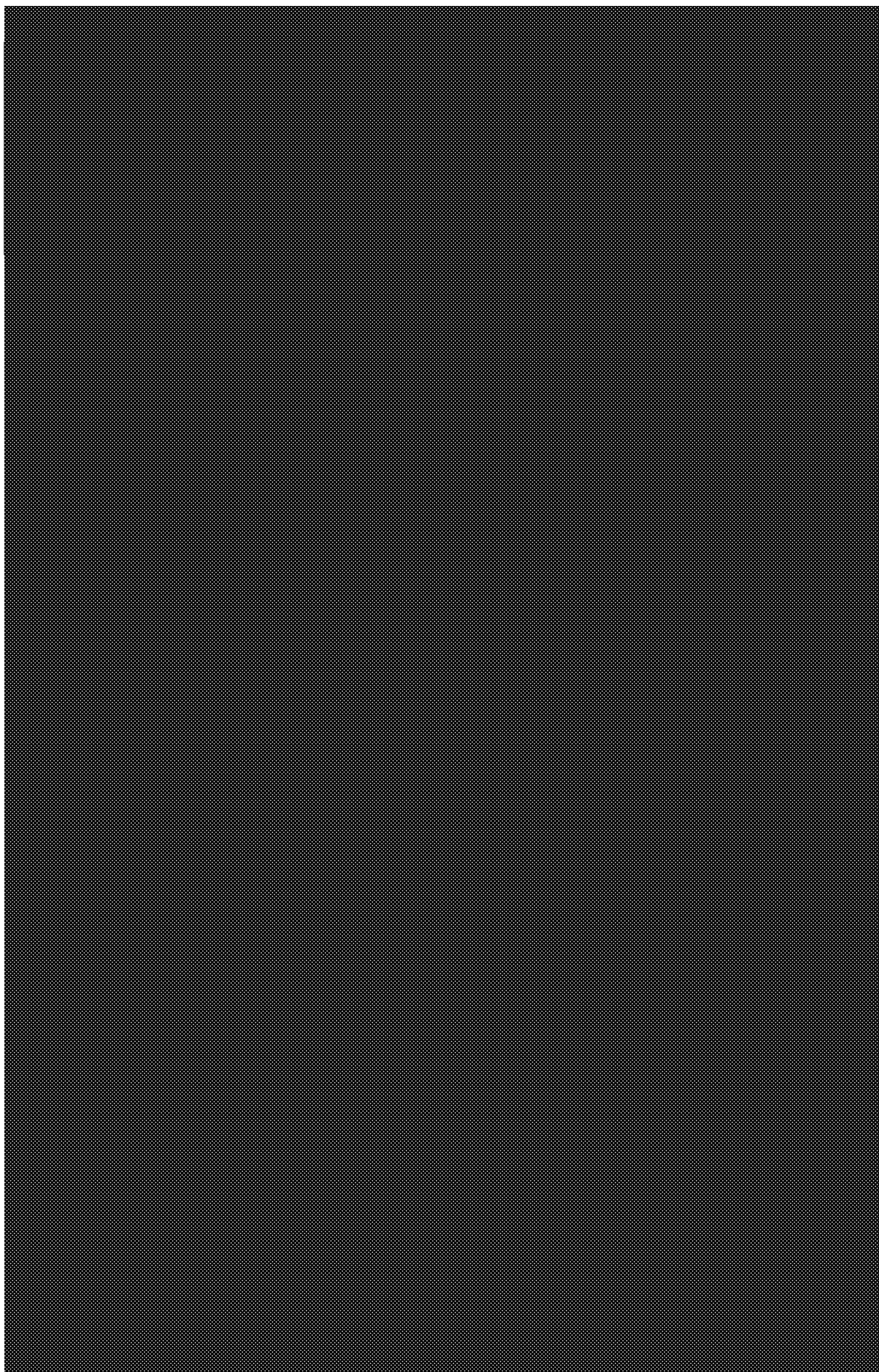
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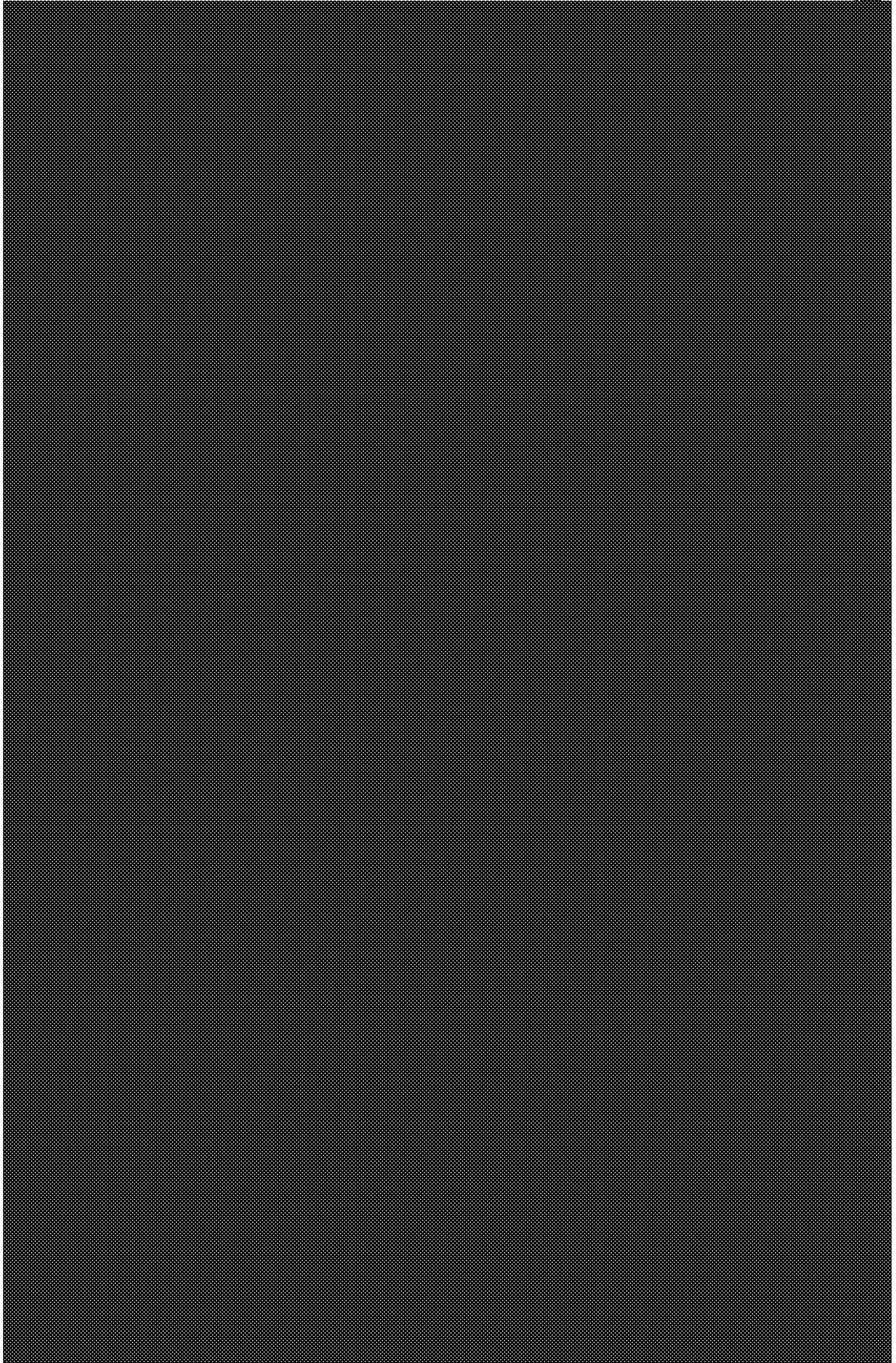




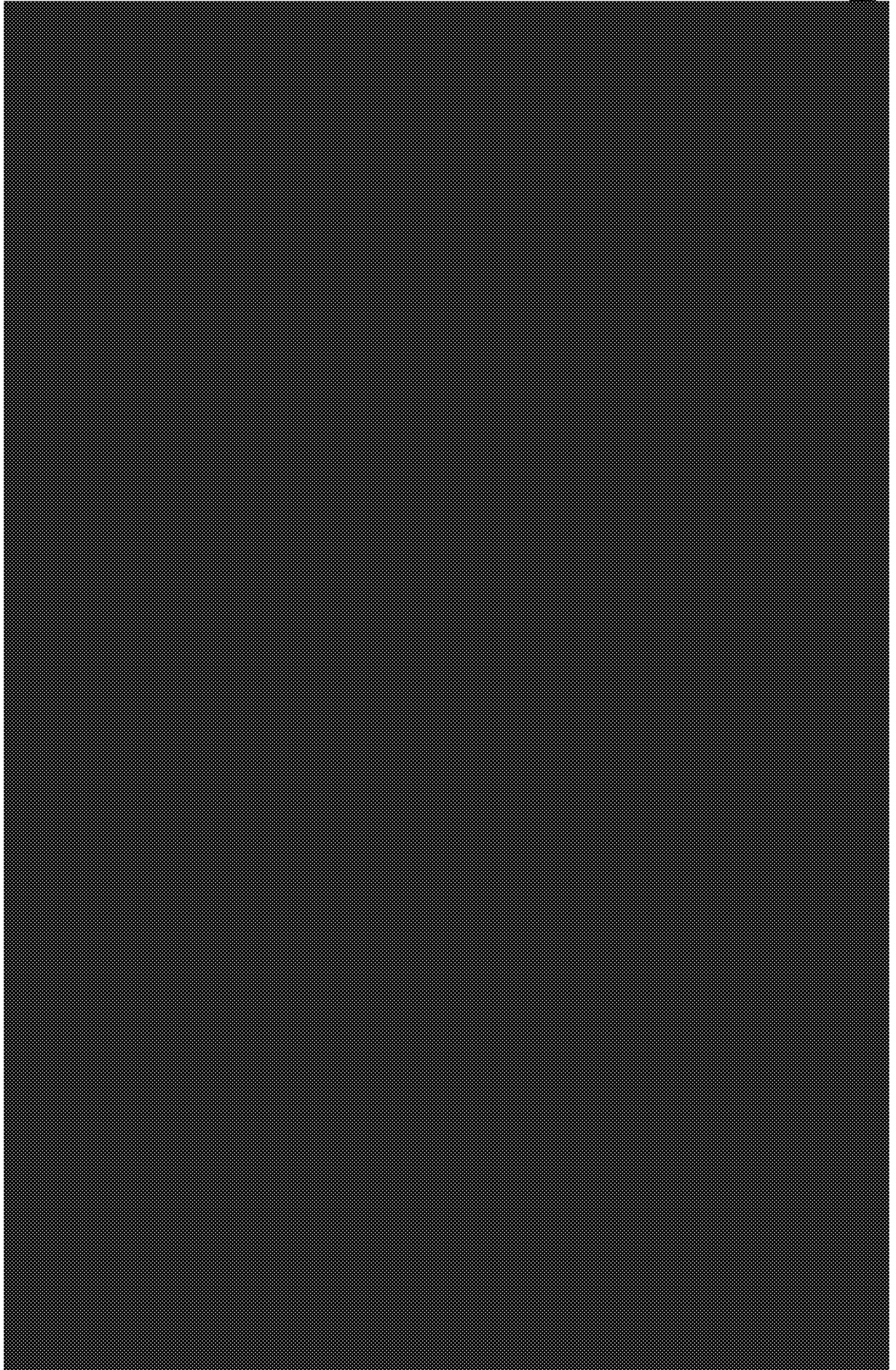
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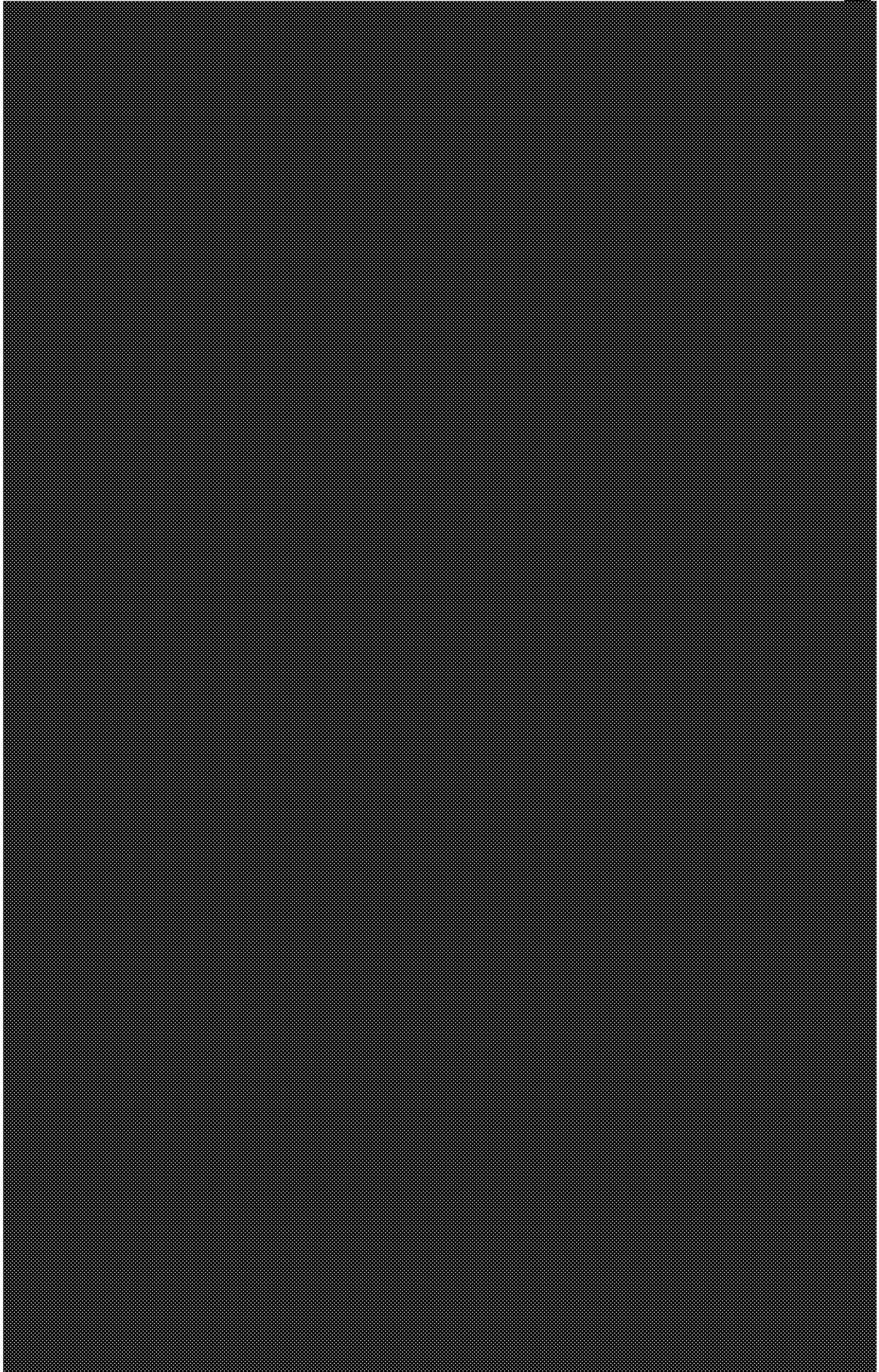
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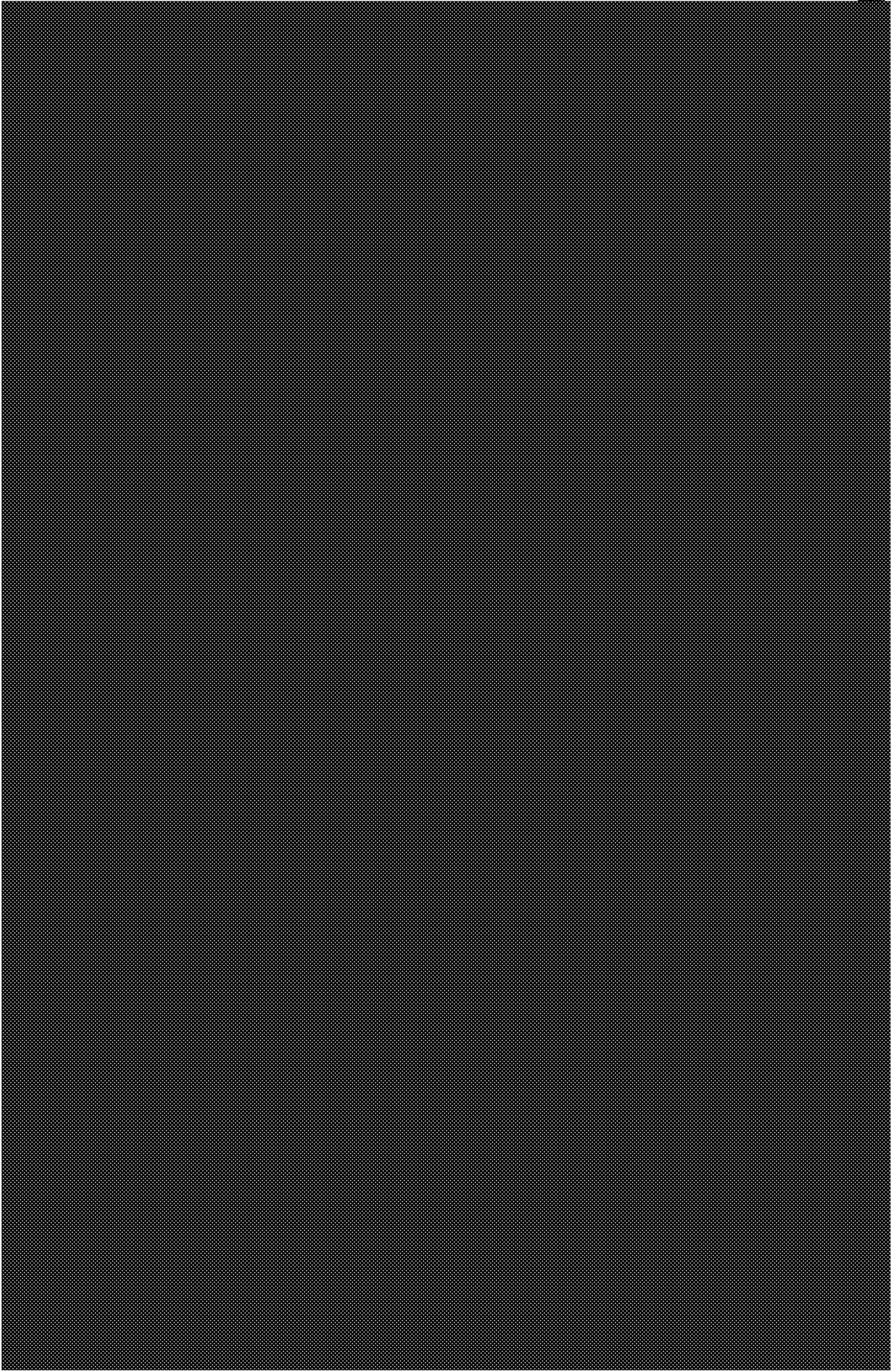
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6.6.5



6.7

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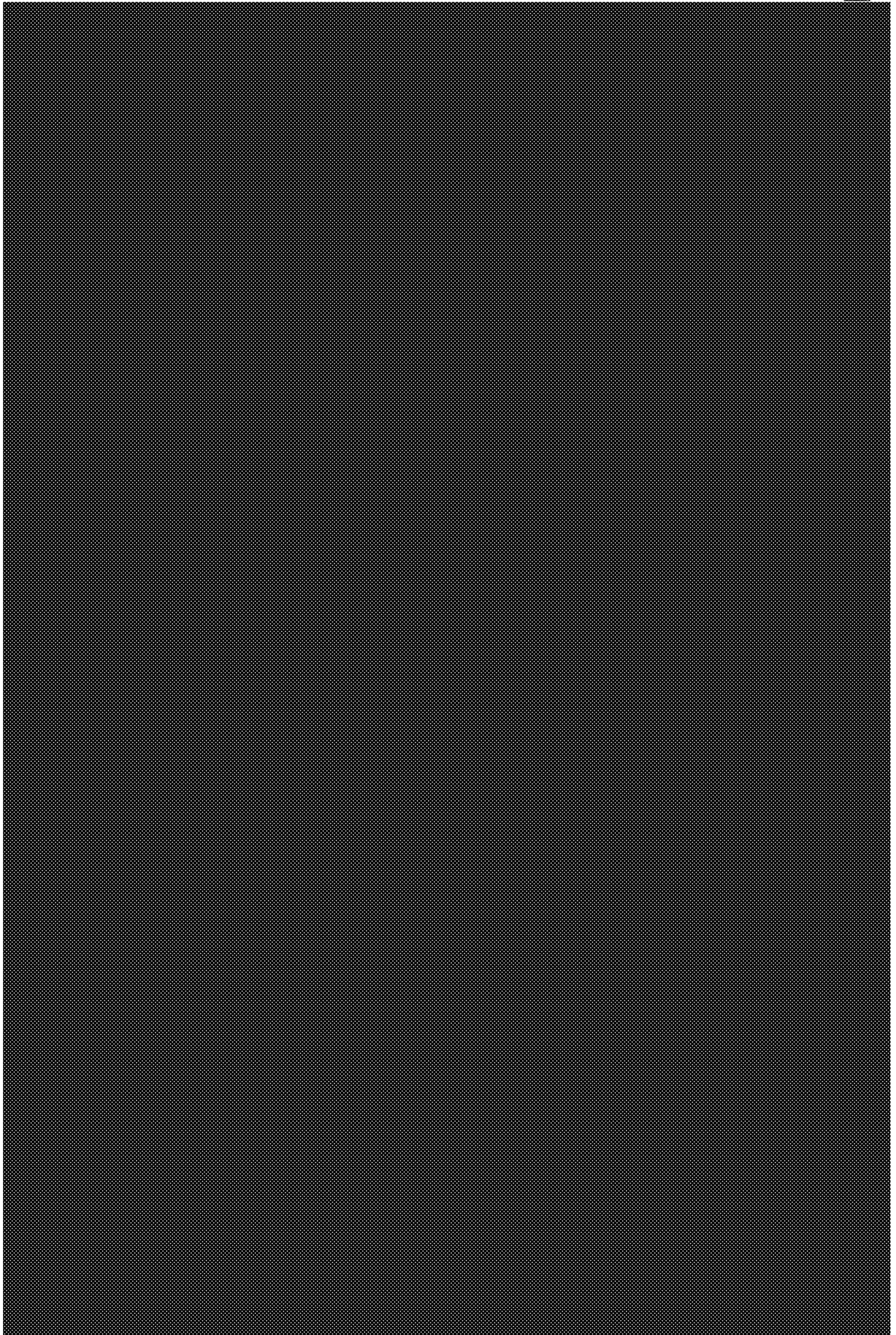
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6.7.4.3

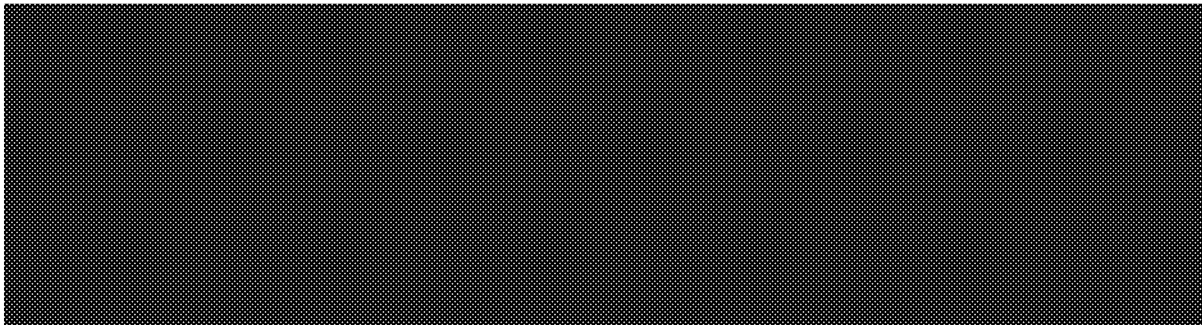
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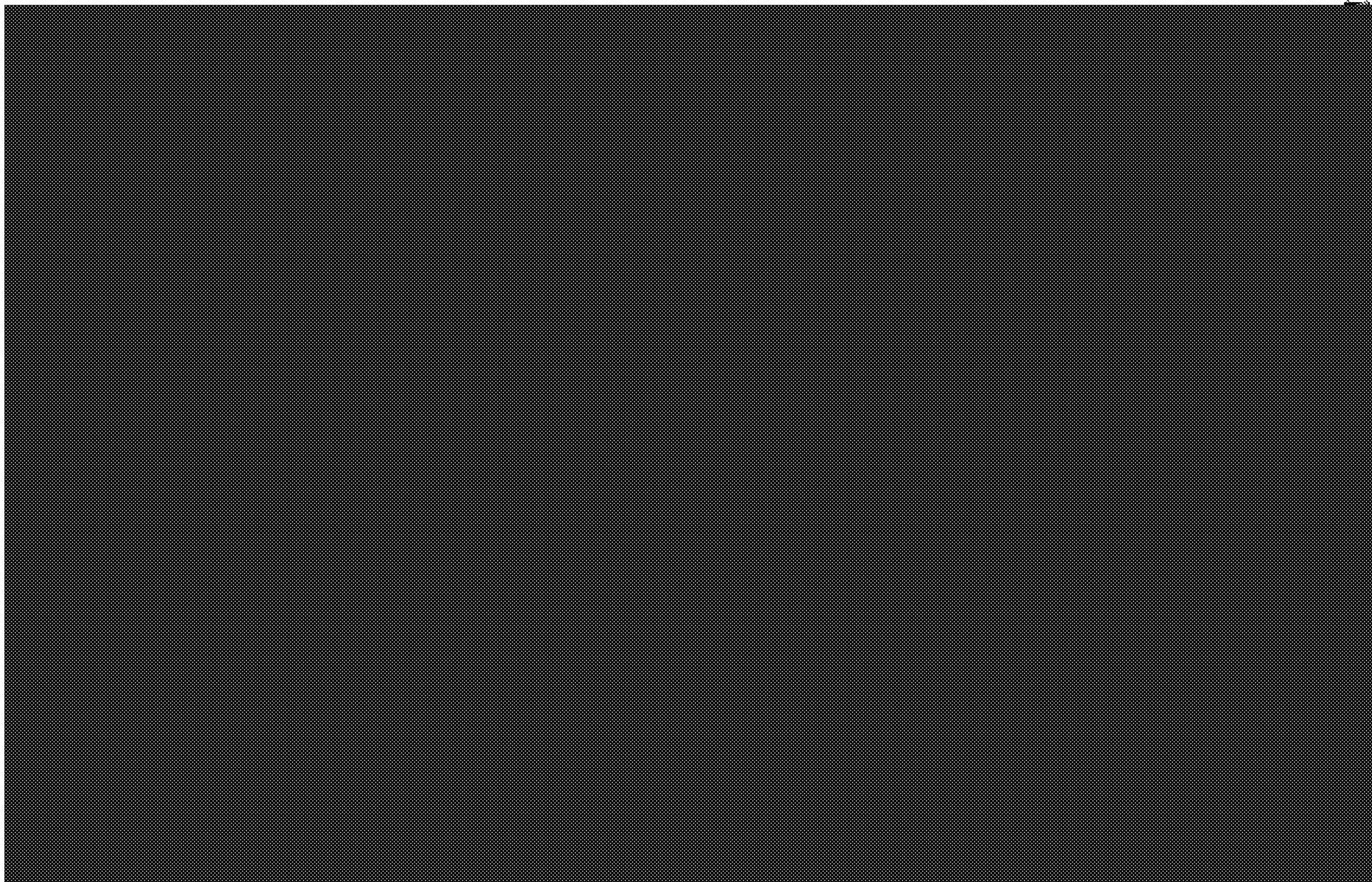
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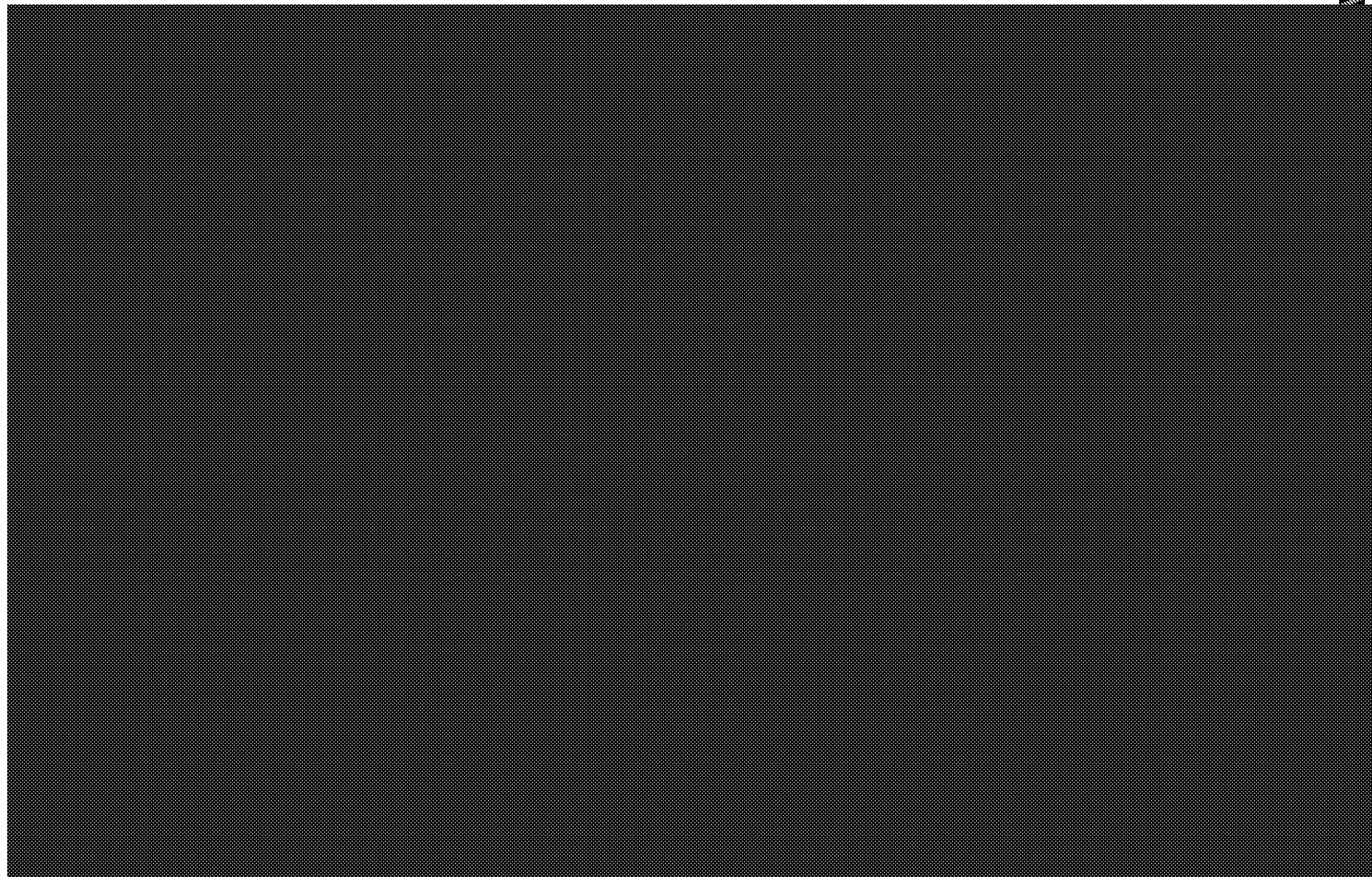
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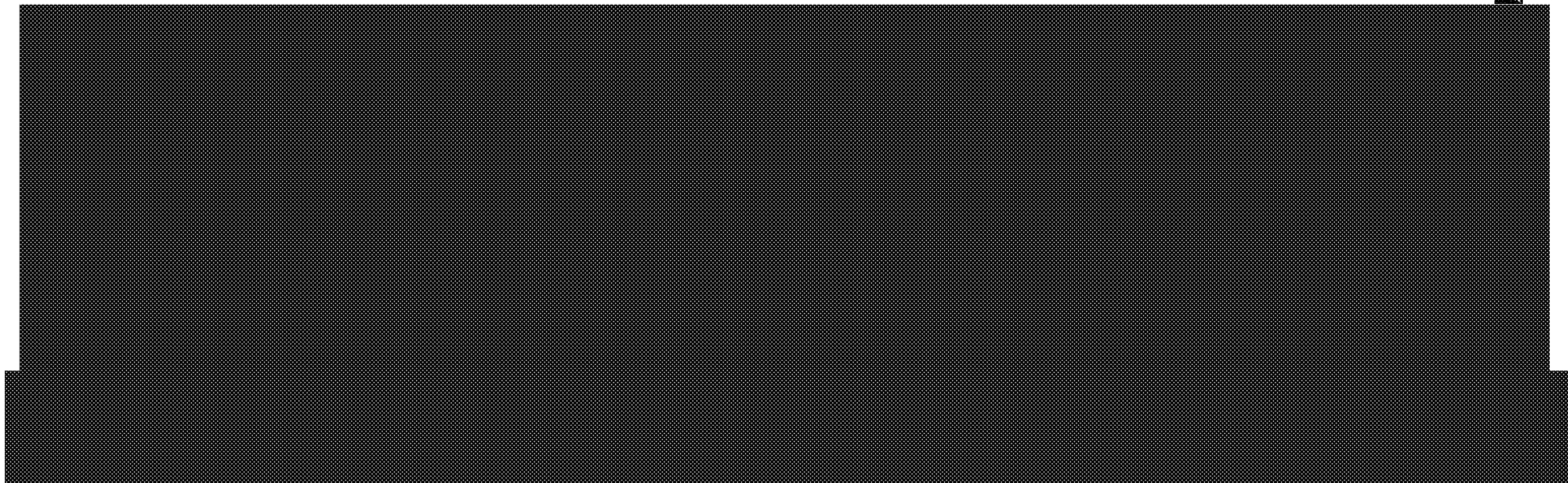












8. Summary and Recommendations

8.1 Summary

8.1.1 [REDACTED]

[REDACTED]

8.1.1.1 Vapour Assessment

[REDACTED] additional vapour monitoring was undertaken in February 2012 comprising two rounds of ambient air sampling and sampling of soil vapour wells.

[REDACTED]

[REDACTED] considered that there is no unacceptable risk to the off

[REDACTED]

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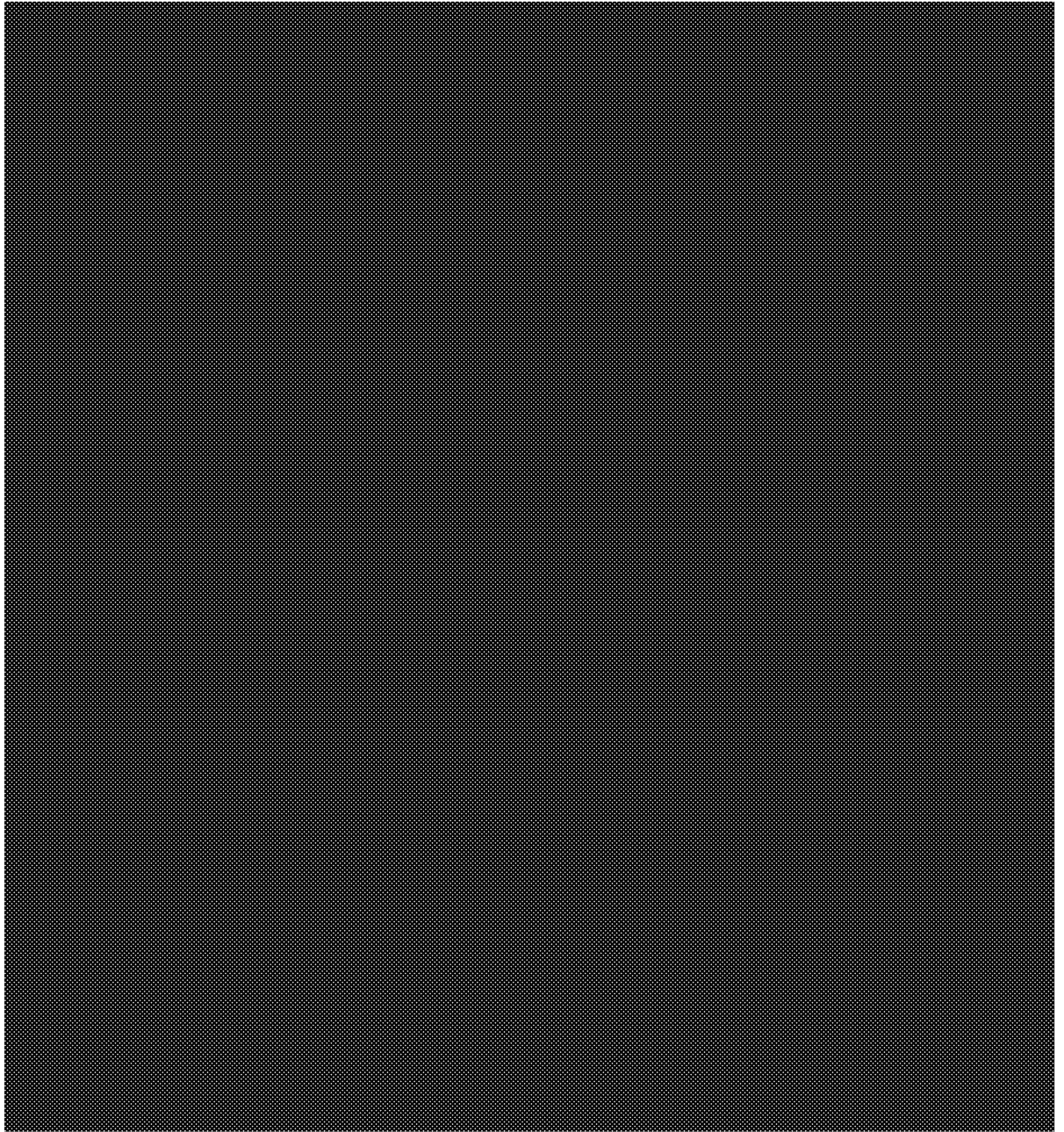
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8.2

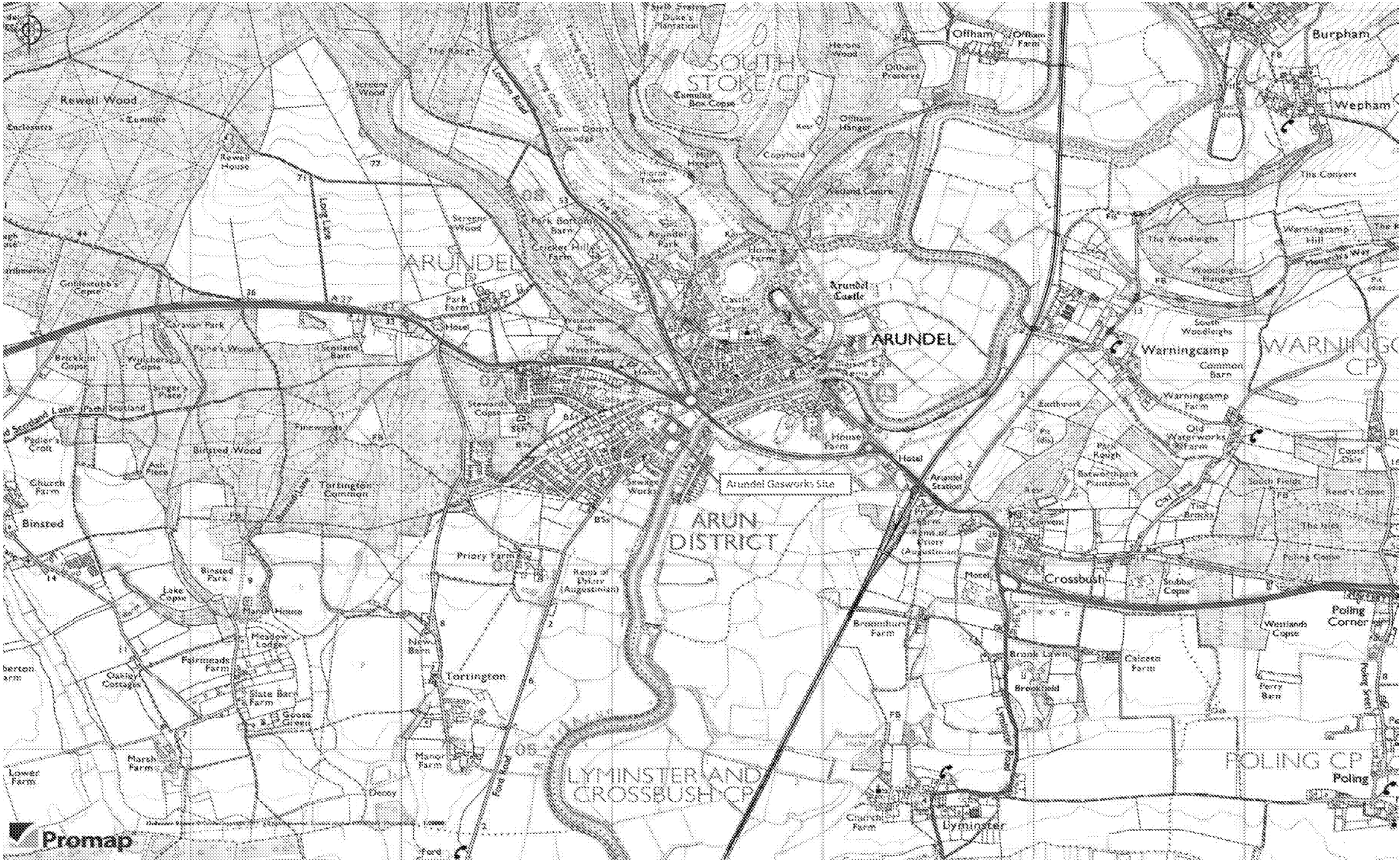




9. References

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Figures



REVISIONS	Drawn by	Checked by	Date

SI & GQRA Report	Rev 0	MW	3/6/11
PURPOSE OF ISSUE	Rev.	Authorised for issue	Date

Atkins Limited
Consulting Engineers
The Axis, 10 Holliday Street
Birmingham, West Midlands B1 1TF
Tel 0121 483 5000
Fax 0121 483 5252

©
THIS DRAWING IS NOT TO BE SCALED

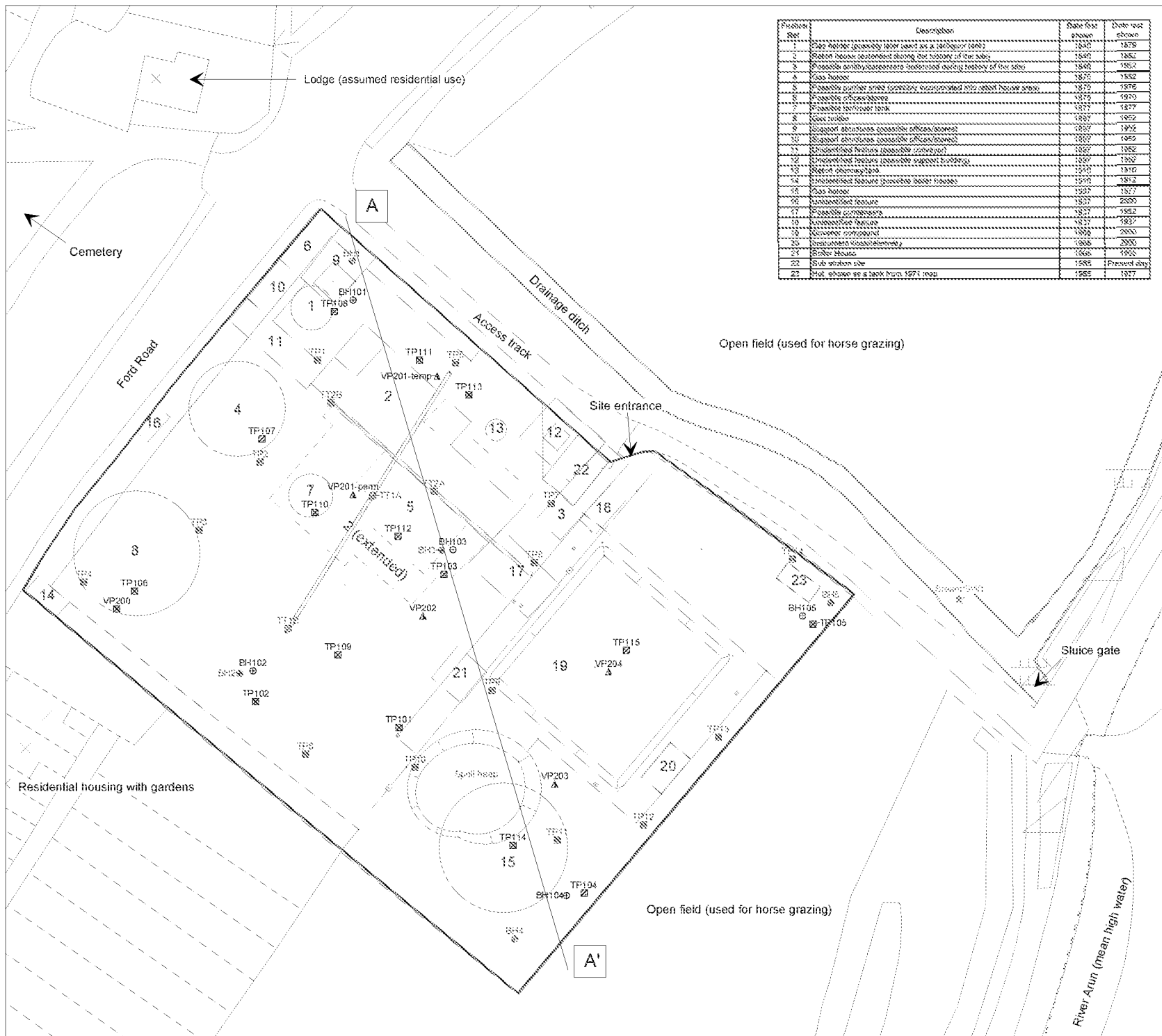
CLIENT
National Grid Property Holdings Limited

PROJECT
**Ford Road, Arundel
Land Contamination Site Investigation and GQRA**

DRAWING TITLE
Site Location Plan

SCALES	DRAWN	CHECKED	CO-ORD CHECK
NTS	LH	ST	-
DATE	03/06/2011	DATE	03/06/2011
0		SHEET	PLOT DATE
		A3	

DRAWING NO **Figure 1** REV 1



Feature Ref	Description	Date first shown	Date last shown
1	Gas holder (possibly later used as a petrol tank)	1940	1979
2	Station house (dependent during our history of the site)	1940	1982
3	Possible anthracite/cast-iron radiators (possibly of the site)	1940	1982
4	Gas holder	1979	1982
5	Possible surface area (possibly incorporated into petrol house area)	1979	1979
6	Possible offices/store	1979	1979
7	Possible petrol tank	1979	1979
8	Coal larder	1979	1979
9	Support structures (possible offices/store)	1979	1979
10	Support structures (possible offices/store)	1979	1979
11	Unidentified feature (possible structure)	1979	1979
12	Unidentified feature (possible support structure)	1979	1979
13	Refurbishment tank	1979	1979
14	Unidentified feature (possible boiler house)	1979	1979
15	Gas holder	1979	1979
16	Unidentified feature	1979	1979
17	Possible structure	1979	1979
18	Unidentified feature	1979	1979
19	Unidentified feature	1979	1979
20	Unidentified feature	1979	1979
21	Sluice gate	1979	1979
22	Sub station site	1979	1979
23	Plot shown as a tank from 1971 map	1979	1979



ATKINS
ATKINS CONSULTANTS Ltd.
WOODCOTE GROVE
ASHLEY ROAD
EPSOM
KT18 5BW
Tel: 01372 726140
Fax: 01372 740055

- LEGEND**
- Site Boundary
 - 2000 Atkins Borehole Location
 - 2000 Atkins Trial Pit Location
 - 2000 Trial Trench Location
 - 2011 Atkins Borehole Location
 - 2011 Atkins Trial Pit Location
 - 2011 Vapour Well Location
 - Surface Water Sample Location

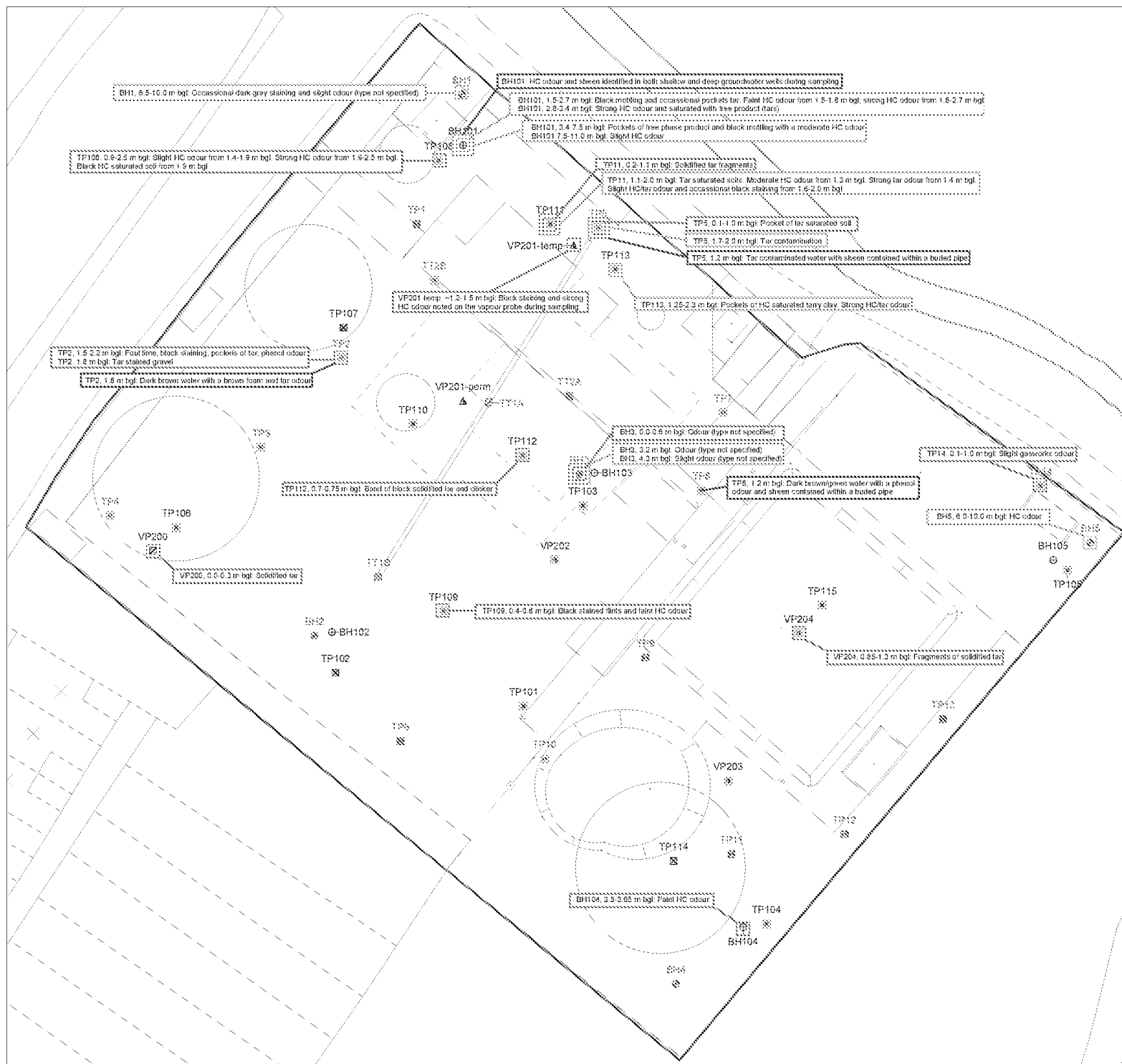
Note: Geological Cross-Section A-A' presented as Figure 5

CLIENT
National Grid Property Holdings Limited

PROJECT
Ford Road, Arundel
Detailed Quantitative Risk Assessment

TITLE
Site Layout Plan, including Historical Features and Site Investigation Locations

FIGURE 2



ATKINS
 ATKINS CONSULTANTS Ltd.
 WOODCOTE GROVE
 ASHLEY ROAD
 EPSOM
 KT18 5BW
 Tel: 01372 726140
 Fax: 01372 740055

LEGEND

- 2000 Atkins Borehole Location
- 2000 Atkins Trial Pit Location
- 2011 Atkins Borehole Location
- 2011 Atkins Trial Pit Location
- 2011 Vapour Well Location
- Total TPH concentration > 1600 mg/kg
- Visual/olfactory evidence of hydrocarbon contamination in the Made Ground
- Visual/olfactory evidence of hydrocarbon contamination in the Alluvium
- Visual/olfactory evidence of hydrocarbon contamination in the Chalk

CLIENT

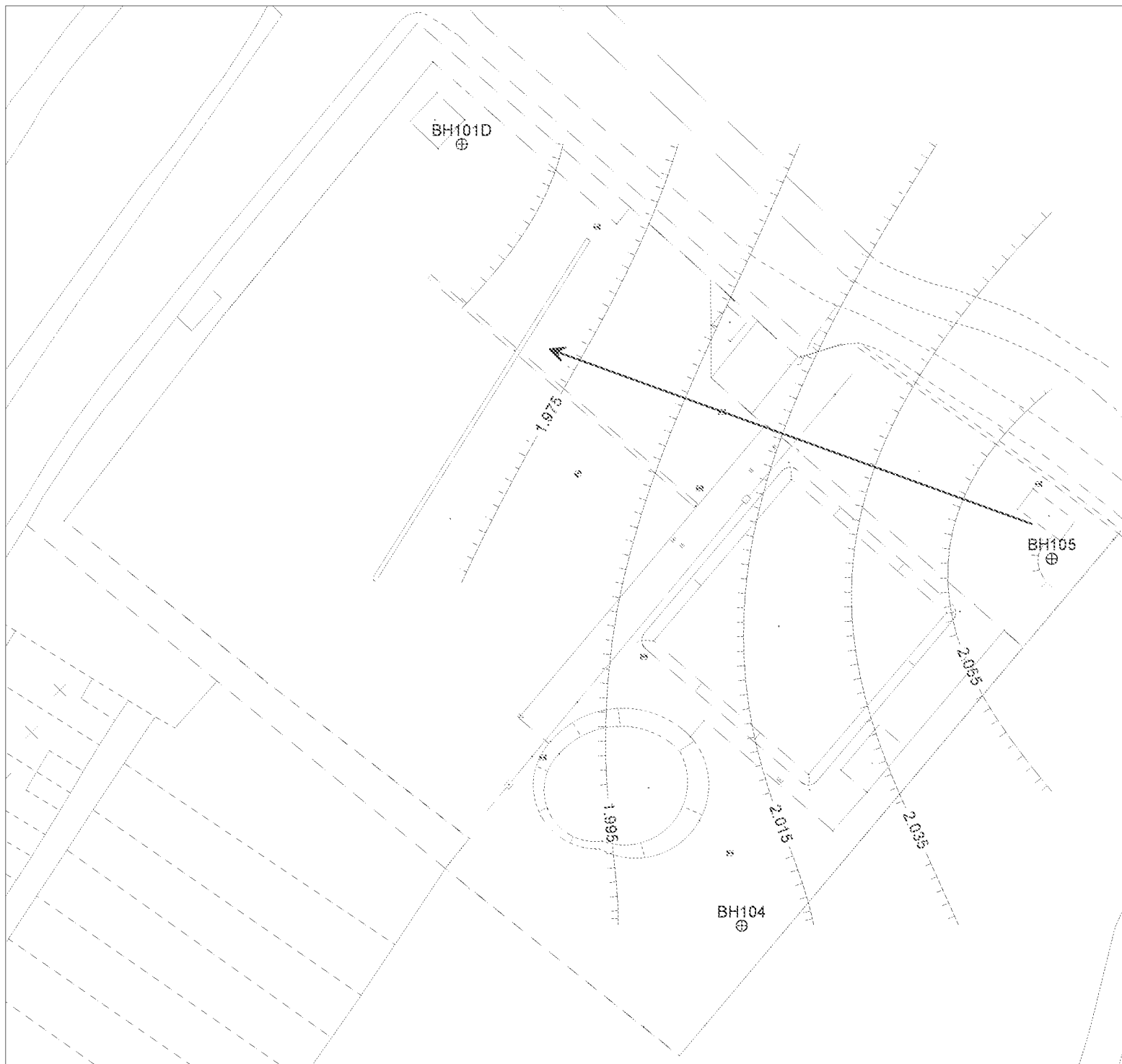
National Grid Property Holdings Limited

PROJECT

Ford Road, Arundel
 Detailed Quantitative Risk Assessment

TITLE

Visual and/or Olfactory Evidence
 of Hydrocarbon Contamination



ATKINS
 ATKINS CONSULTANTS Ltd.
 WOODCOTE GROVE
 ASHLEY ROAD
 EPSOM
 KT18 5BW
 Tel: 01372 726140
 Fax: 01372 740055

LEGEND

-  Groundwater level monitoring location
-  Groundwater level (m aOD)
-  Groundwater flow direction (high tide)

CLIENT

National Grid Property Holdings Limited

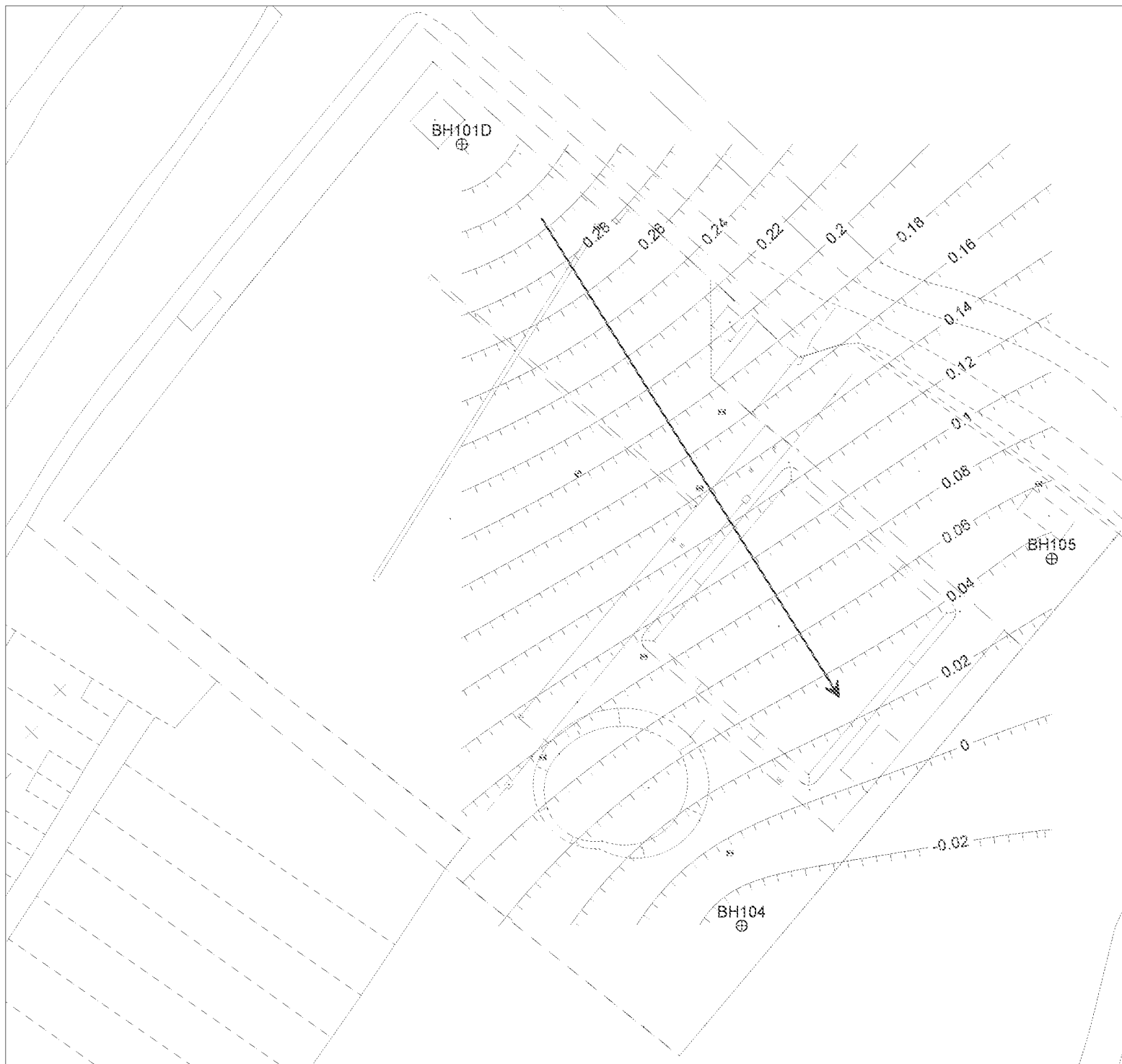
PROJECT

Ford Road, Arundel
 Land Contamination Site Investigation and
 Generic Quantitative Risk Assessment

TITLE

Chalk Groundwater Elevation
 High Tide at 00:34, 15th July 2011

FIGURE 4A



ATKINS
 ATKINS CONSULTANTS Ltd.
 WOODCOTE GROVE
 ASHLEY ROAD
 EPSOM
 KT18 5BW
 Tel: 01372 726140
 Fax: 01372 740055

LEGEND

-  Groundwater level monitoring location
-  Groundwater level (m aOD)
-  Groundwater flow direction (low tide)

CLIENT

National Grid Property Holdings Limited

PROJECT

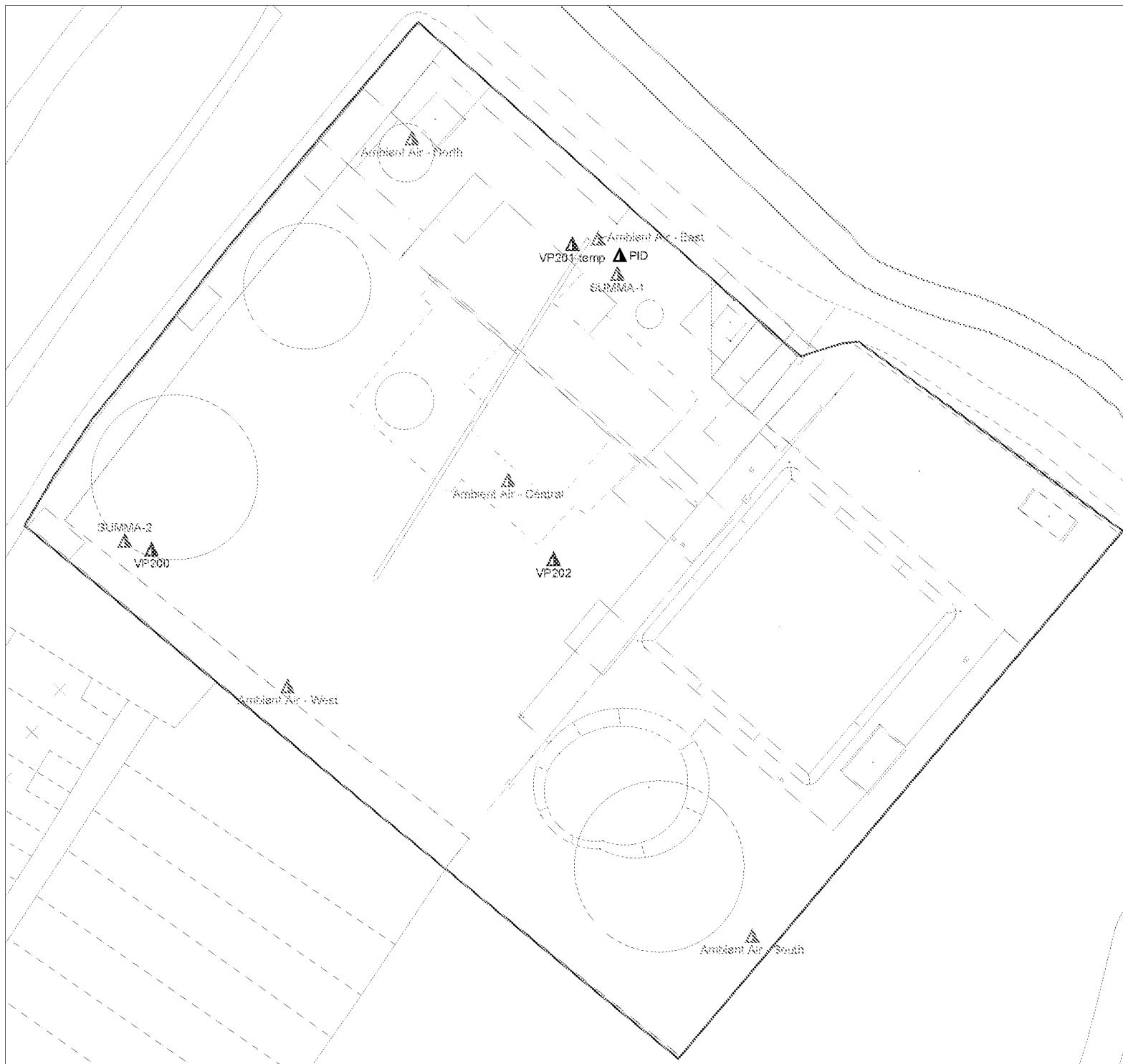
Ford Road, Arundel

Land Contamination Site Investigation and
 Generic Quantitative Risk Assessment

TITLE

Chalk Groundwater Elevation
 Low Tide at 19:24, 17th July 2011

FIGURE 4B



ATKINS
 ATKINS CONSULTANTS Ltd.
 WOODCOTE GROVE
 ASHLEY ROAD
 EPSOM
 KT18 5BW
 Tel: 01372 726140
 Fax: 01372 740055

LEGEND

-  Location of seven-day (minimum) passive ambient air sampling with analysis for BTEX (two sampling rounds)
-  Location of sampling from vapour wells installed in 2011 with analysis for TPH and VOCs (one sampling round)
-  Location of eight-hour continuous ambient air sampling using SUMMA canisters with analysis for TPH, VOCs and TICs (two sampling rounds)
-  Location of eight-hour continuous semi-quantitative ambient air VOC monitoring using a PID (ppb) (two rounds)

CLIENT

National Grid Property Holdings Limited

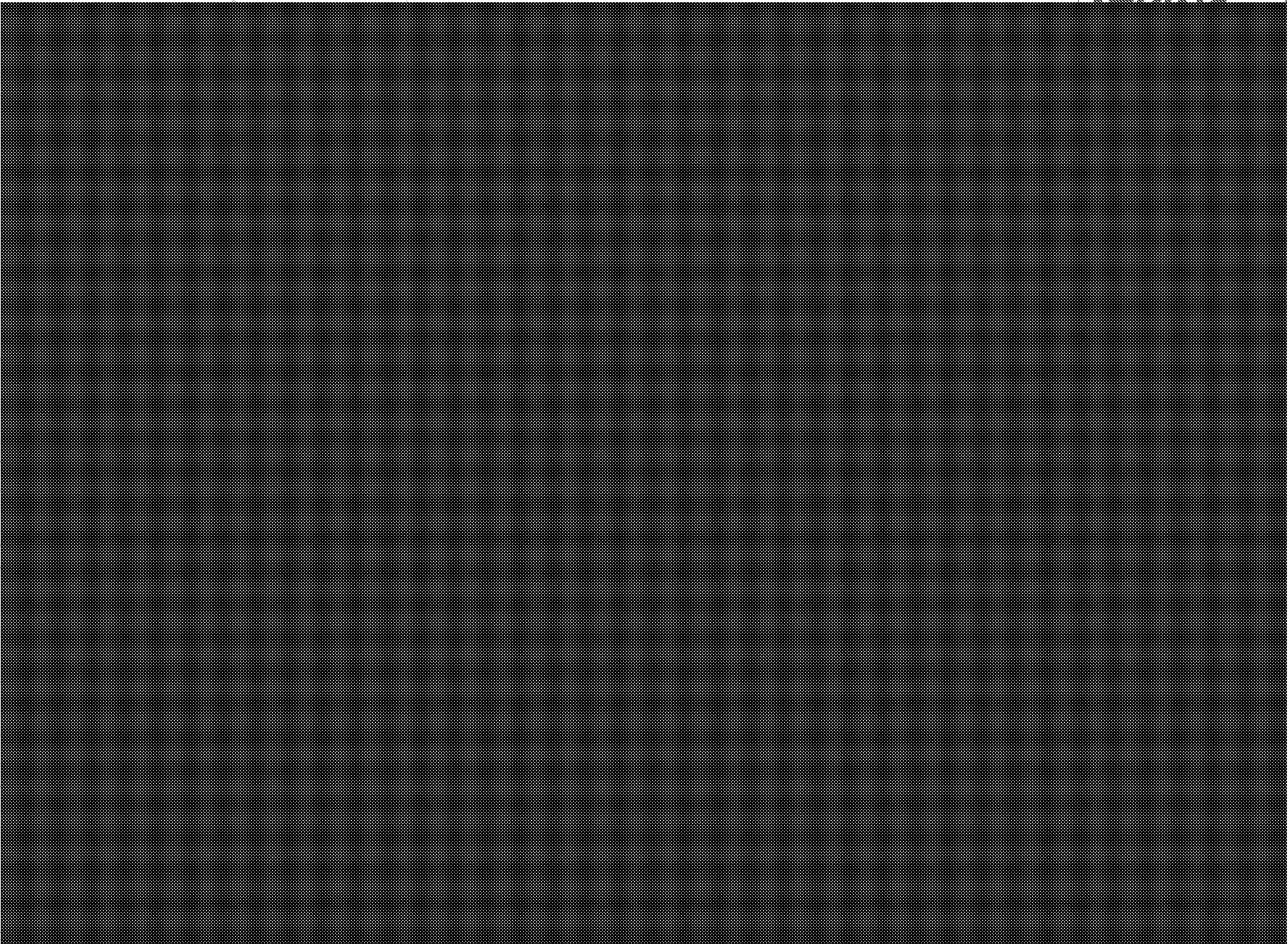
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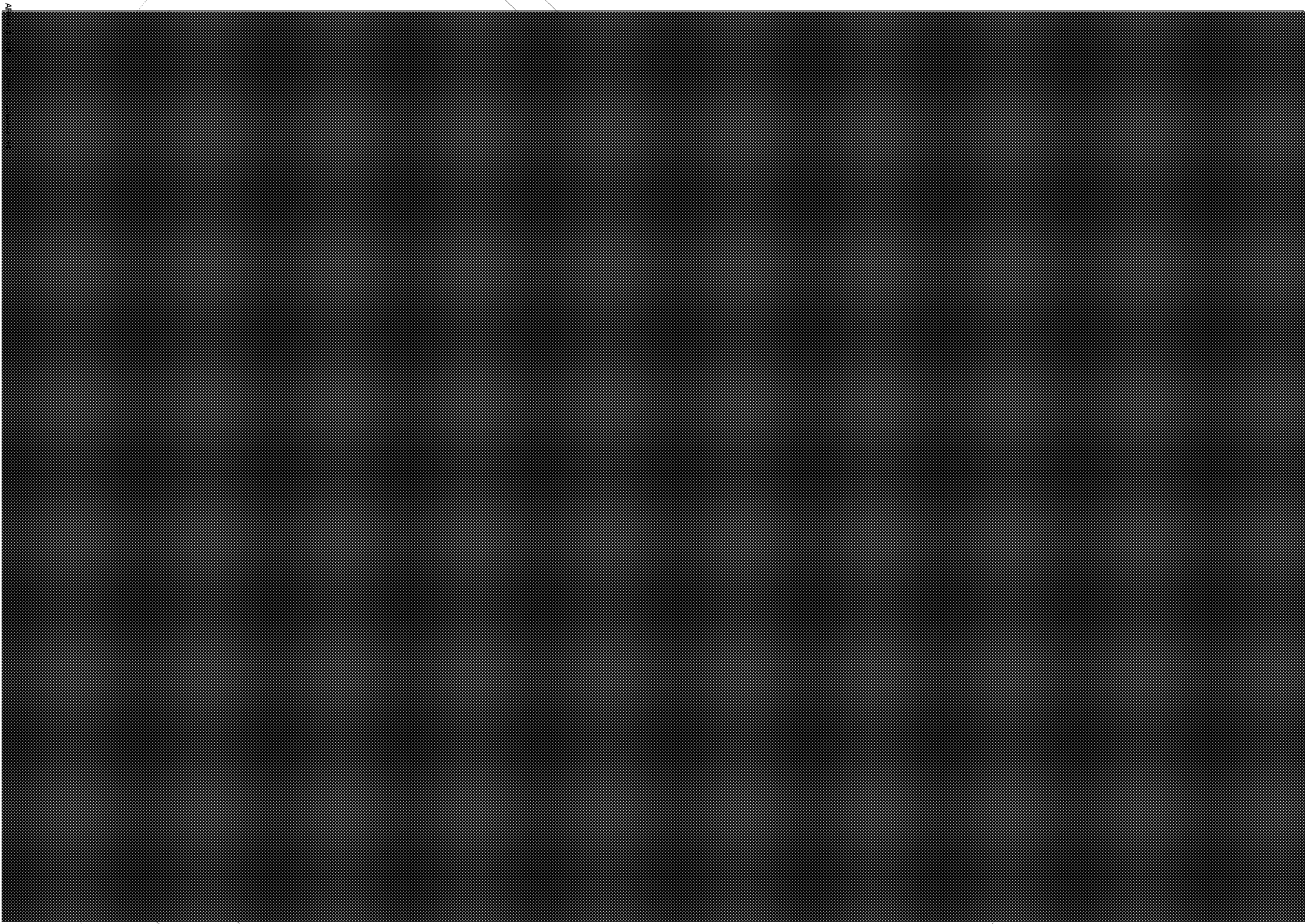
Ford Road, Arundel
 Detailed Quantitative Risk Assessment

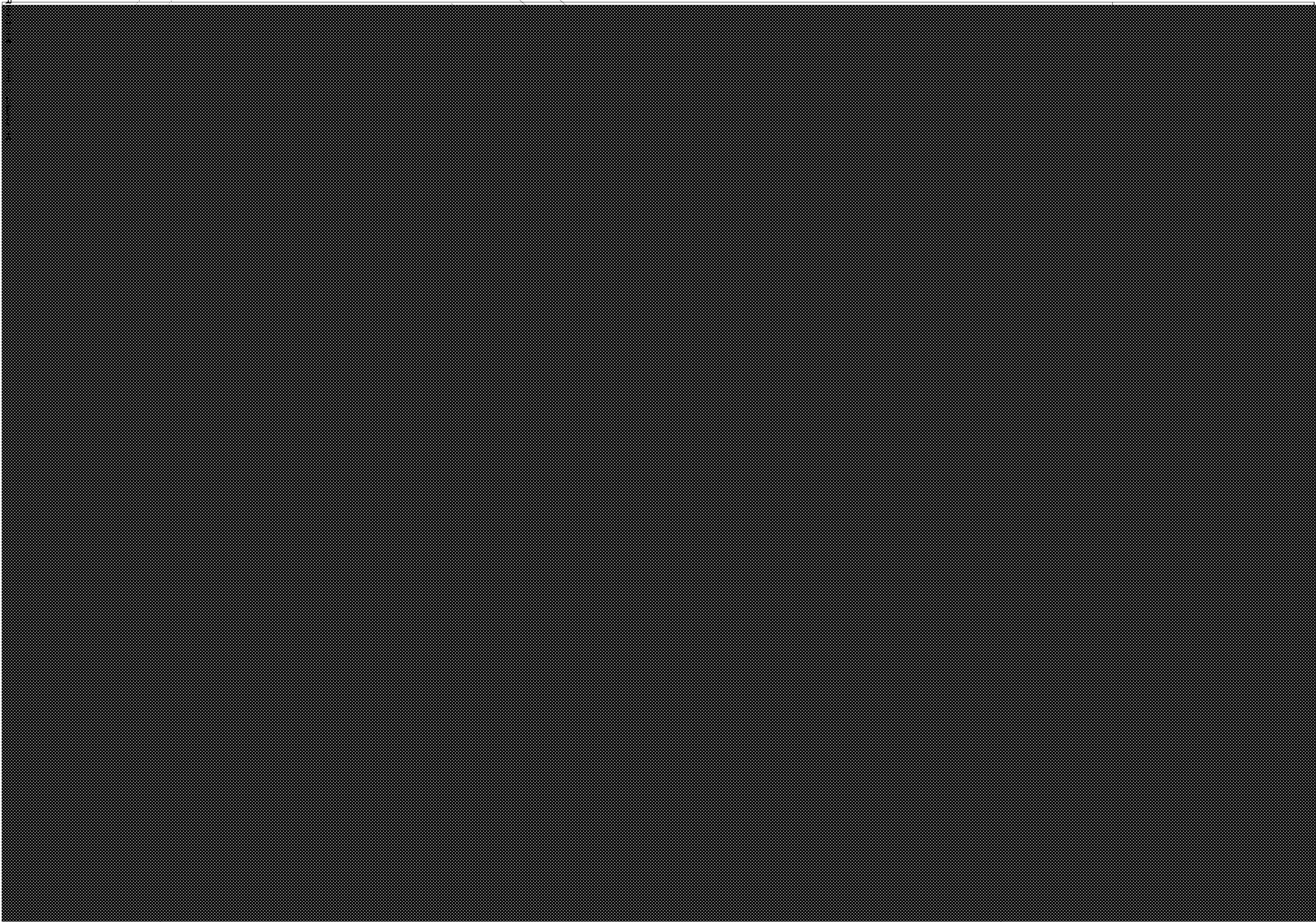
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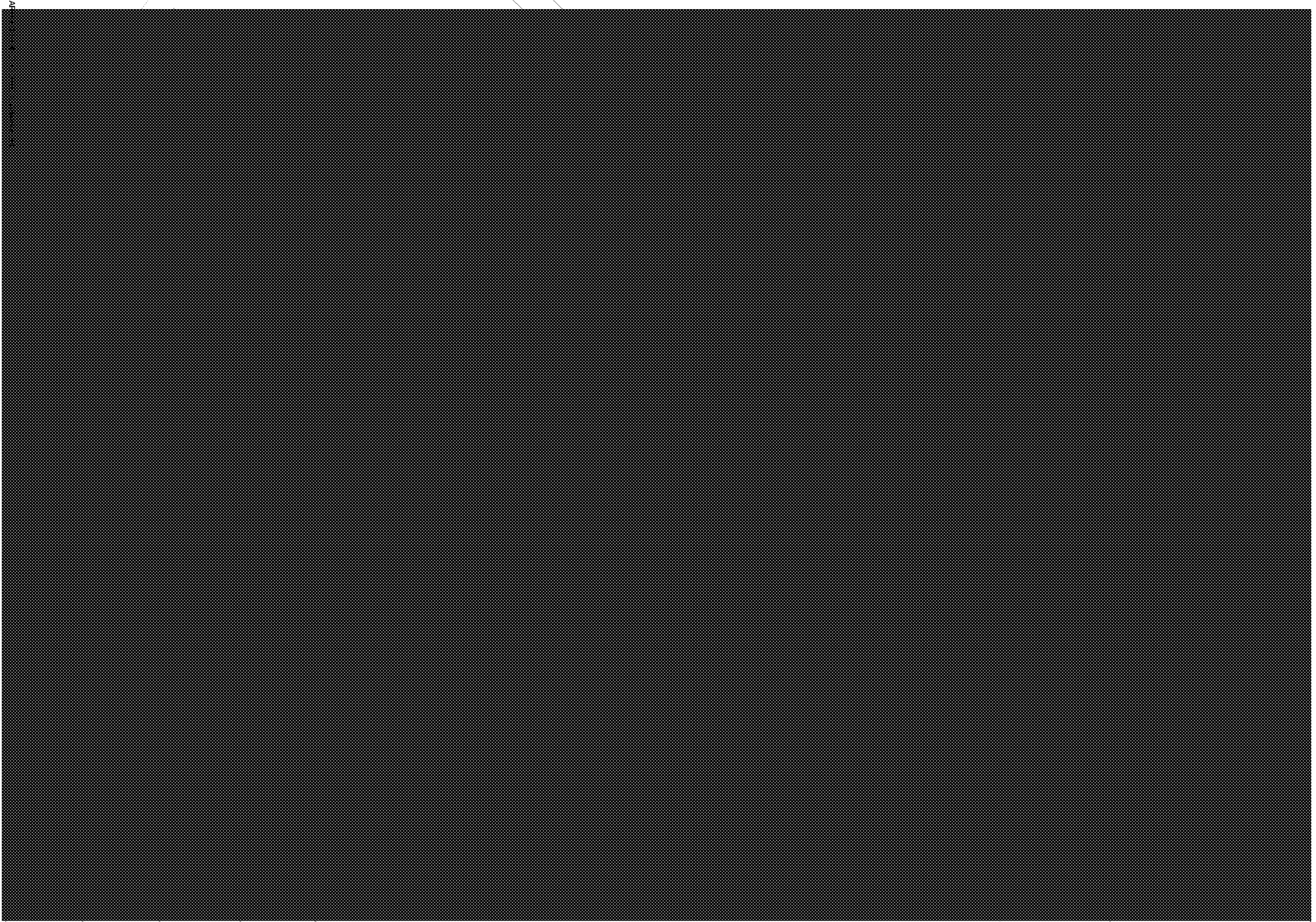
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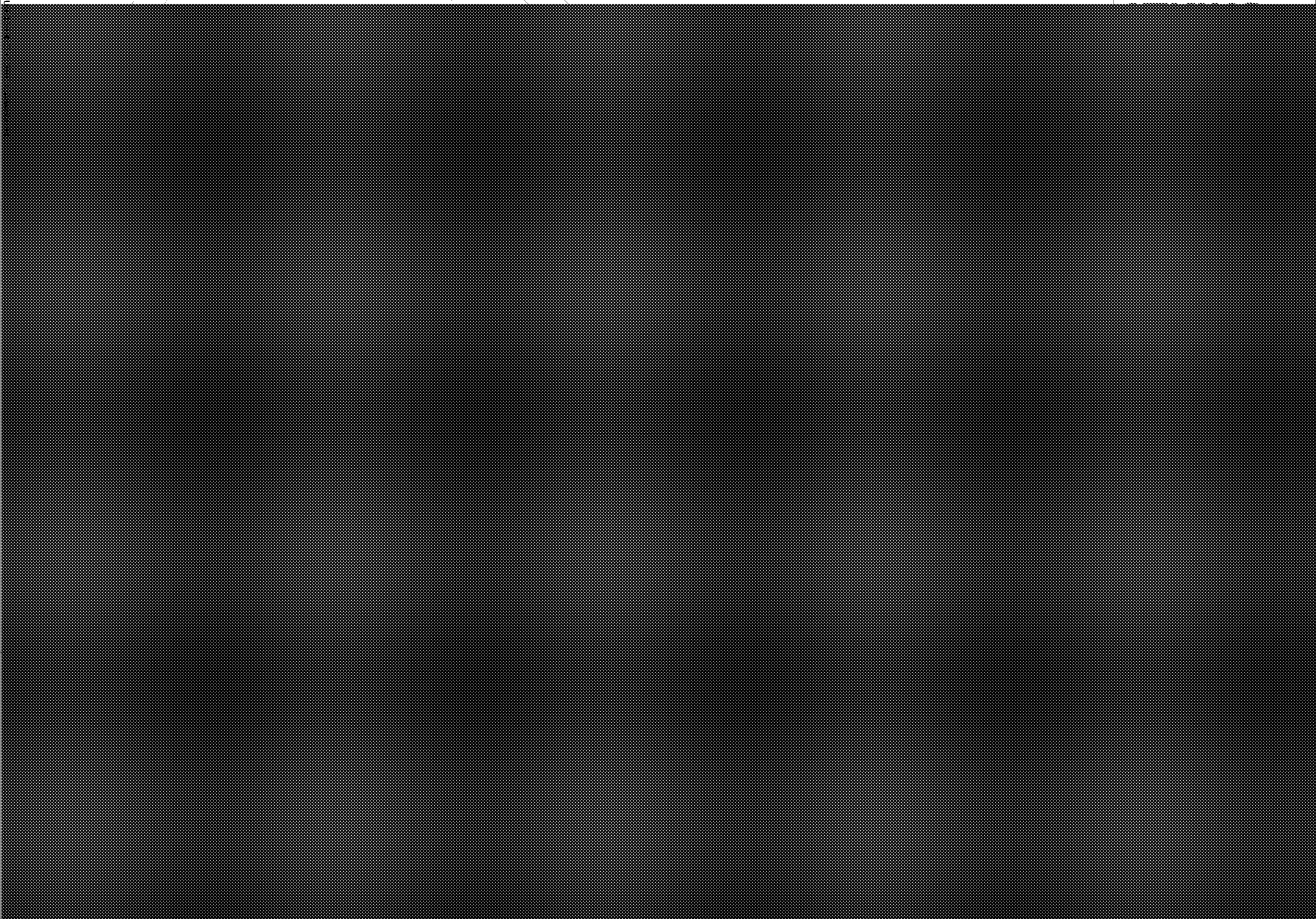
FIGURE 4













Appendices

Appendix A

Vapour Sampling Analytical Results



Certificate of Analysis

CHEMEX
The Business of Science

Chemex Report Number: 12B36A- Volatile Organics

Client Name and Address: Lucy Hay
Atkins
Sir William Atkins House
Ashley Avenue
Epsom, Surrey
KT18 5AL

Project Code: ARUNDEL
Chemex Quote No: CB120209/E110627
Order No: 12156160

Date of Sample Receipt: 01 March 2012
Turnaround: Standard

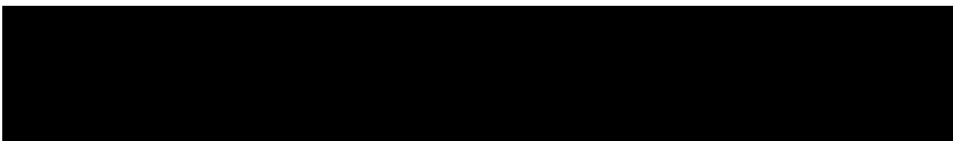
Any opinions or interpretations expressed in this report are outside the scope of UKAS accreditation.

No guarantees are given that this data is representative of the whole or any other part of the site from which the samples originated. Tests covered by this certificate were conducted in accordance with Chemex method procedures, which may not accord in every detail with published methods.

Should this report require incorporation into client report, it must be used in its entirety.

Any queries regarding this report should be addressed in the first instance, to our client liaison officers, contact details as below.

Authorised:



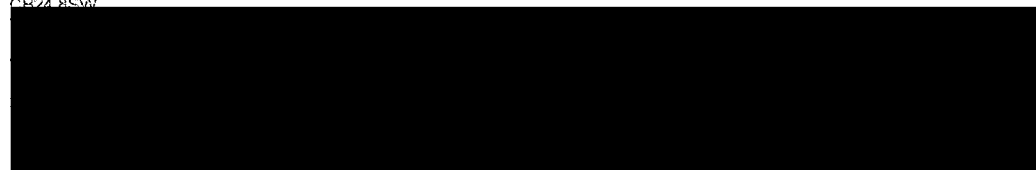
Julian Froment BSc Hons MInstP
Project Manager

Dorota Mielnikonis MSc
Quality Assurance Department.

Date report issued:

16 March 2012

CHEMEX ENVIRONMENTAL INTERNATIONAL LTD
Environmental Analysis and Ecotoxicology
Unit J, Broad Lane Industrial Estate
Cottenham
Cambridge
CB24 8SW



Sample Receipt Date:	Time:	SDG:
01 MARCH 2012	08:50	A

TABLE OF SAMPLES ANALYSED

Sampling Date / Time:	Analysis Date	Within Holding Time?	Client ID:	Bottle No:	Lab ID:	Matrix:
28-Feb-12	02-Mar-12	Yes	VP202	E066433	12B36A01A	AIR
29-Feb-12	02-Mar-12	Yes	VP200	E068592	12B36A02A	AIR
29-Feb-12	15-Mar-12	No	VP201-temp	G0161255	12B36A03AR	AIR

PROJECT NOTES

The samples arrived at Chemex at an ambient temperature.

The sampling times were not recorded.

Tenax Tube analysis:

This analysis was carried out using our new Perkin Elmer Automated Thermal Desorption unit (ATD). We are still in the process of carrying out validation on this new piece of analytical equipment, and hope that this will provide an improved analytical method for the analysis of air samples.

At this stage of the development, it does appear that currently we have difficulties in sufficiently recovering a number of the lighter compounds in the target compound list (dichlorodifluoromethane, chloromethane, vinyl chloride, bromomethane and chloroethane). These compounds have been removed, and are not reported, as their performance appears unsatisfactory. We hope to improve upon the method in due course and we should be able to have greater certainty in the performance of the method as more supporting analytical data is generated. Currently there is a requirement to raise the detection limit for 2-nitropropane and 4-methyl-2-pentanone by a factor of 10 as their analytical performance appears variable. On this occasion 4-methyl-2-pentanone did perform well and indications suggest that lower limits of detection may be achievable in the long-term.

At the client's request the sample data were examined for the presence of non-target compounds by the Chemex tentatively identified compound (TICs) procedure. Where found, these are reported on the form 1E.

This report also contains data presented according to the TPHCWG speciation and banding protocol. It should be noted that, due to the limitations of the TIC's procedure, this data treatment should be viewed as an approximation only.

CHEMEX ENVIRONMENTAL INTERNATIONAL
VOLATILE ORGANICS IN AIR

Project No :	12B36A	Project code:	ARUNDEL	Turnaround:	STD
16 Mar 12 12:11					
Lab Sample ID :	12B36A01A	12B36A02A	12B36A03AR	0302BLKA	0315BLKA
Client ID :	VP202	VP200	VP201-temp	BLANK	BLANK
Bottle No :	E066433	E068592	G0161255	BLANK0302A	BLANK0315A
Matrix :	AIR	AIR	AIR	AIR	AIR
Volume/Weight :	Whole tube	Whole tube	Whole tube	Whole tube	Whole tube
Sample Litres Pumped :	3.0	2.9	3.1	1.0	1.0
Scaling Factor :	0.30	0.30	0.30	1.0	1.0

COMPOUND	Concentration ng/L				
Dichlorodifluoromethane	-	-	-	-	-
Chloromethane	-	-	-	-	-
Vinyl chloride	-	-	-	-	-
Bromomethane	-	-	-	-	-
Chloroethane	-	-	-	-	-
Trichlorofluoromethane	<2	<2	<2	<5	<5
Acetone	<15	<15	<15	<50	<50
Diethyl ether	<3	<3	<3	<10	<10
1,1-Dichloroethene	<2	<2	<2	<5	<5
Carbon disulfide	<1	<1	<1	<4	<4
Allyl chloride	<3	<3	<3	<10	<10
Methylene chloride	<2	<2	<2	<5	<5
Trans-1,2-dichloroethene	<2	<2	<2	<5	<5
tert-butyl methyl ether	<2	<2	<2	<5	<5
1,1-Dichloroethane	<2	<2	<2	<5	<5
2-Butanone	<15	<15	<15	<50	<50
cis-1,2-Dichloroethene	<2	<2	<2	<5	<5
2,2-Dichloropropane	<2	<2	<2	<5	<5
Chloroform	<1	<1	<1	<4	<4
Tetrahydrofuran	<30	<30	<30	<100	<100
1,1,1-Trichloroethane	<1	<1	<1	<4	<4
1,2-Dichloroethane	<2	<2	<2	<5	<5
1-Chlorobutane	<2	<2	<2	<5	<5
1,1-Dichloropropene	<2	<2	<2	<5	<5
Benzene	3	2	1100	<4	<4
Carbon tetrachloride	<2	<2	<2	<5	<5
2-Nitropropane	<30	<30	<30	<100	<100
Methyl methacrylate	<3	<3	<3	<10	<10
2-Hexanone	<5	<5	<5	<15	<15
4-Methyl-2-pentanone	<75	<75	<75	<250	<250
1,2-Dichloropropane	<2	<2	<2	<5	<5
Trichloroethene	<2	<2	<2	<5	<5
Dibromomethane	<2	<2	<2	<5	<5
Bromodichloromethane	<2	<2	<2	<5	<5
trans-1,3-Dichloropropene	-	-	-	-	-
cis-1,3-Dichloropropene	<2	<2	<2	<5	<5
Toluene	51	15	2500	<5	<5

CHEMEX ENVIRONMENTAL INTERNATIONAL
VOLATILE ORGANICS IN AIR

Project No :	12B36A	Project code:	ARUNDEL	Turnaround:	STD
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16 Mar 12 12:11

Lab Sample ID :	12B36A01A	12B36A02A	12B36A03AR	0302BLKA	0315BLKA
Client ID :	VP202	VP200	VP201-temp	BLANK	BLANK
Bottle No :	E066433	E068592	G0161255	BLANK0302A	BLANK0315A
Matrix :	AIR	AIR	AIR	AIR	AIR
Volume/Weight :	Whole tube	Whole tube	Whole tube	Whole tube	Whole tube
Sample Litres Pumped :	3.0	2.9	3.1	1.0	1.0
Scaling Factor :	0.30	0.30	0.30	1.0	1.0

COMPOUND	Concentration ng/L				
1,1,2-Trichloroethane	<2	<2	<2	<5	<5
1,3-Dichloropropane	<2	<2	<2	<5	<5
Ethyl methacrylate	<3	<3	<3	<10	<10
Dibromochloromethane	<2	<2	<2	<5	<5
1,2-Dibromoethane	<2	<2	<2	<5	<5
Tetrachloroethene	<2	<2	<2	<5	<5
Chlorobenzene	<1	<1	<1	<4	<4
1,1,1,2-Tetrachloroethane	<2	<2	<2	<5	<5
Ethylbenzene	27	6	290	<4	<4
m&p-Xylene	120	24	1100	<8	<8
Styrene	<2	<2	95	<5	<5
Bromoform	<2	<2	<2	<5	<5
o-Xylene	45	10	540	<4	<4
1,1,2,2-Tetrachloroethane	<2	<2	<2	<5	<5
1,2,3-Trichloropropane	<2	<2	<2	<5	<5
Isopropylbenzene	5	<1	15	<5	<5
trans-1,4-Dichloro-2-butene	-	-	-	-	-
Bromobenzene	<2	<2	<2	<5	<5
2-Chlorotoluene	<2	<2	<2	<5	<5
n-Propylbenzene	18	4	<2	<5	<5
4-Chlorotoluene	<2	<2	<2	<5	<5
1,3,5-Trimethylbenzene	24	7	260	<5	<5
Pentachloroethane	<3	<3	<3	<10	<10
1,2,4-Trimethylbenzene	67	23	260	<5	<5
tert-Butylbenzene	14	5	<2	<5	<5
1,3-Dichlorobenzene	<2	<2	<2	<5	<5
sec-Butylbenzene	12	4	4	<5	<5
1,4-Dichlorobenzene	<2	<2	<2	<5	<5
4-Isopropyltoluene	17	6	8	<5	<5
1,2-Dichlorobenzene	<2	<2	<2	<5	<5
n-Butylbenzene	13	5	<1	<5	<5
Hexachloroethane	<3	<3	<3	<10	<10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<5	<5
1,2,4-Trichlorobenzene	<2	<2	<2	<5	<5
Naphthalene	2	<2	100	<5	<5
1,2,3-Trichlorobenzene	<2	<2	<2	<5	<5
Hexachlorobutadiene	<2	<2	<2	<5	<5

CHEMEX ENVIRONMENTAL INTERNATIONAL
VOLATILE ORGANICS IN AIR

Project No : 12B36A Project code: ARUNDEL Turnaround: STD

16 Mar 12 12:11

Lab Sample ID :	12B36A01A	12B36A02A	12B36A03AR	0302BLKA	0315BLKA
Client ID :	VP202	VP200	VP201-temp	BLANK	BLANK
Bottle No :	E066433	E068592	G0161255	BLANK0302A	BLANK0315A
Matrix :	AIR	AIR	AIR	AIR	AIR
Volume/Weight :	Whole tube	Whole tube	Whole tube	Whole tube	Whole tube
Sample Litres Pumped :	3.0	2.9	3.1	1.0	1.0
Scaling Factor :	0.30	0.30	0.30	1.0	
Lab QC No:					

ALIPHATICS(Concentration ng/L)

C5-C6	-	-	-	-	-
>C6-C8	29.0	65.0	283.0	-	-
>C8-C10	584.0	324.0	12.0	-	-
>C10-C12	576.0	271.0	-	-	-
>C12-C16	-	-	-	-	-
>C16-C21	-	-	-	-	-
>C21-C35	-	-	-	-	-

AROMATICS(Concentration ng/L)

C5-C7	3.0	2.0	1100.0	-	-
>C7-C8	51.0	15.0	2500.0	-	-
>C8-C10	546.0	83.0	2573.0	-	-
>C10-C12	117.0	30.0	117.0	-	-
>C12-C16	-	-	-	-	-
>C16-C21	-	-	-	-	-
>C21-C35	-	-	-	-	-

Key: - = Not detected

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VP202

Lab Name: Chemex Contract: ARUNDEL

Lab Code: STD Case No.: 12B36 SAS No.: STD SDG No.: A

Matrix: (soil/water) AIR Lab Sample ID: E066433

Sample wt/vol: Whole tube Lab File ID: 12B36A01A

Level: (low/med) LOW Date Received: 01/03/2012

% Moisture: not dec. Date Analyzed: 02/03/2012

GC Column: HP 5MS ID: 0.25 (mm) Dilution Factor: .3

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

Number TICs found: 18 ng/L

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q
1. 000123-86-4	Acetic acid, butyl ester	7.65	29	JND
2. 002051-30-1	Octane, 2,6-dimethyl-	9.47	70	JND
3. 014676-29-0	Heptane, 3-ethyl-2-methyl-	9.59	41	JND
4. 017301-94-9	Nonane, 4-methyl-	9.94	68	JND
5. 000098-82-8	Benzene, (1-methylethyl)-	9.99	130	JND
6. 000611-14-3	Benzene, 1-ethyl-2-methyl-	10.30	84	JND
7. 029053-04-1	Cyclopentane, 1-methyl-3-(2-met	10.36	45	JND
8. 000124-18-5	Decane	10.58	360	JND
9. 002847-72-5	Decane, 4-methyl-	10.95	100	JND
10. 005989-54-8	Cyclohexene, 1-methyl-4-(1-meth	11.09	41	JND
11. 001678-93-9	Cyclohexane, butyl-	11.12	65	JND
12. 017302-32-8	Nonane, 3,7-dimethyl-	11.21	31	JND
13. 001074-43-7	Benzene, 1-methyl-3-propyl-	11.44	63	JND
14. 006975-98-0	Decane, 2-methyl-	11.61	44	JND
15. 013151-34-3	Decane, 3-methyl-	11.71	56	JND
16. 000934-80-5	Benzene, 4-ethyl-1,2-dimethyl-	11.86	22	JND
17. 000586-62-9	Cyclohexene, 1-methyl-4-(1-meth	12.04	39	JND
18. 001120-21-4	Undecane	12.17	200	JND

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VP200

Lab Name: Chemex Contract: ARUNDEL
 Lab Code: STD Case No.: 12B36 SAS No.: STD SDG No.: A
 Matrix: (soil/water) AIR Lab Sample ID: E068592
 Sample wt/vol: Whole tube Lab File ID: 12B36A02A
 Level: (low/med) LOW Date Received: 01/03/2012
 % Moisture: not dec. Date Analyzed: 02/03/2012
 GC Column: HP 5MS ID: 0.25 (mm) Dilution Factor: .3
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

Number TICs found: 17 ng/L

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q
1. 000542-55-2	Formic acid, 2-methylpropyl ester	5.82	19	JND
2. 000107-98-2	2-Propanol, 1-methoxy-	6.25	28	JND
3. 000123-86-4	Acetic acid, butyl ester	7.65	18	JND
4. 002051-30-1	Octane, 2,6-dimethyl-	9.46	27	JND
5. 014676-29-0	Heptane, 3-ethyl-2-methyl-	9.60	18	JND
6. 017301-94-9	Nonane, 4-methyl-	9.94	29	JND
7. 001072-16-8	Octane, 2,7-dimethyl-	9.98	46	JND
8. 004291-80-9	Cyclohexane, 1-methyl-3-propyl-	10.30	34	JND
9. 000124-18-5	Decane	10.57	170	JND
10. 002847-72-5	Decane, 4-methyl-	10.95	53	JND
11. 005989-27-5	D-Limonene	11.09	28	JND
12. 001678-93-9	Cyclohexane, butyl-	11.12	31	JND
13. 001074-17-5	Benzene, 1-methyl-2-propyl-	11.44	19	JND
14. 006975-98-0	Decane, 2-methyl-	11.61	22	JND
15. 013151-34-3	Decane, 3-methyl-	11.71	27	JND
16. 000586-62-9	Cyclohexene, 1-methyl-4-(1-meth	12.04	17	JND
17. 001120-21-4	Undecane	12.17	93	JND

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VP201-temp

Lab Name: Chemex Contract: ARUNDEL
 Lab Code: STD Case No.: 12B36 SAS No.: STD SDG No.: A
 Matrix: (soil/water) AIR Lab Sample ID: G0161255
 Sample wt/vol: Whole tube Lab File ID: 12B36A03AR
 Level: (low/med) LOW Date Received: 01/03/2012
 % Moisture: not dec. Date Analyzed: 15/03/2012
 GC Column: HP 5MS ID: 0.25 (mm) Dilution Factor: .3
 Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

Number TICs found: 12 ng/L

CAS NO.	COMPOUND NAME	RT	EST. CONC.	Q
1. 002809-69-0	2,4-Hexadiyne	6.40	120	JND
2. 000110-02-1	Thiophene	6.63	15	JND
3. 005150-80-1	1,6-Heptadien-3-yne	9.51	140	JND
4. 000554-14-3	Thiophene, 2-methyl-	9.59	8	JND
5. 000111-65-9	Octane	9.72	5	JND
6. 000616-44-4	Thiophene, 3-methyl-	9.82	6	JND
7. 000111-84-2	Nonane	12.30	5	JND
8. 000632-16-6	Thiophene, 2,3-dimethyl-	12.66	5	JND
9. 014676-29-0	Heptane, 3-ethyl-2-methyl-	13.35	4	JND
10. 000611-14-3	Benzene, 1-ethyl-2-methyl-	14.30	9	JND
11. 000124-18-5	Decane	14.63	6	JND
12. 000095-13-6	Indene	16.48	9	JND

APPENDIX 1

POINTS TO NOTE

1. The data for all soil samples are expressed as the dry weight concentration. With the exception of metals analysis samples are analysed on an 'as submitted' basis. Data for soils and similar solid samples are calculated on the basis of dry weight (drying temperature 105°C) according to the SOP 1190.

For metals analyses, soil samples are air dried at <30°C overnight, crushed and sieved through a 250µm sieve before taking a sub-sample for digestion (some volatile species may be lost during this process). The digestion of samples on an 'as received' basis are carried out only when requested by the client.

Metals analysis carried out on a filtered and acid digested water sample represents environmentally available metals. Metals analysis carried out on an unfiltered and acid digested water sample represents total metals. Metals analysis carried out on a filtered (not acid digested) water sample represents dissolved metals.

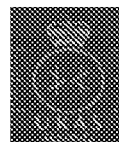
2. Sample data for all matrices are presented without correction for surrogate or spike recovery or any concentrations detected in the method blank unless indicated in the Project Notes.
3. Sample duplicates, matrix spike or matrix spike duplicates will be run upon request, but an additional charge may be incurred.
4. Whilst Chemex hold MCERTS accreditation for sand, loam and clay, or any material where these constitute the major part of the sample, other materials would require additional validation and quality control to satisfy the MCERTS Standard. Any data failing to comply with the MCERTS Standard will be flagged or identified in the Project Notes. Occasionally, the nature of samples will result in data being generated that fails to satisfy the requirements of the MCERTS Standard. Moreover, under certain circumstances, the level of analytes present or the sample matrix may make it necessary to adopt modified procedures. Full details of such changes and the subsequent effect upon accreditation status will be recorded in the Project Notes.
5. Data in this report have been presented in the Chemex less than (<) the scaled method detection limit (MDL) format. This format reports concentrations detected below the MDL as < the appointed scaled MDL for a particular compound, having taken into account any dilutions, weights or volumes taken and percent moisture as applicable.
6. Method Detection Limit (MDL) is the minimum concentration of the analyte in a sample that can be detected with a prescribed level of confidence of distinguishing the concentration from a background signal.
7. In order to be able to make a valid comparison of the sample data with blank levels, account has to be taken of the applied scaling factor. Unless stated in the project notes all MDL values in the report are already scaled.
8. The laboratory takes a representative sub sample from the received sample. Large stones, organic substances etc. are removed from the soil samples. Where water samples contain sediment, the sample is decanted and the sediment not included in the extraction process.
9. The US EPA recommended temperature range for sample storage is $4 \pm 2^\circ\text{C}$.
10. Where dates of analysis for each parameter are not routinely included in the report, they are available upon request.
11. Whilst Chemex endeavours to meet requested turnarounds times wherever possible, these cannot be guaranteed. Clients will be informed if there is any likelihood of turnaround times not being met.
12. Chemex recommended holding times, within this report referred to as *Holding Times*, are based on published international standards/ guidelines, in-house experimentally validated periods or where no other advice is available estimated and should be used solely for guidance. Chemex makes no claim regarding the appropriateness of holding times or the effect of varying holding times on sample integrity.



Jones Environmental Laboratory

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Atkins
Ashley Avenue
Epsom
KT18 5AL



No.4225

Attention : Lucy Hay
Date : 24th February, 2012
Your reference :
Our reference : Test Report 12/1752 Batch 1
Location : ARUNDEL
Date samples received : 22nd February, 2012
Status : Final report
Issue : 1

Two samples were received for analysis on 22nd February, 2012. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

J W Farrell- Jones CChem FRSC
Chartered Chemist

Ken Scally MSc FRSC
Technical Director /
Laboratory Manager

Report : Gas

JE Job No.: 12/1752

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: EASTERN BOUNDARY

Depth:

JE Job No: 12/1752

JE Sample No: 1

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 20 Feb 2012

Date of Receipt: 22 Feb 2012

Date Analysed: 23 Feb 2012

Initial Vacuum (inches Hg)

-30

Final Pressure (psi)

0

PID Reading (ppm)

0

Canister Serial number

481

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
75-45-6	86.77	Chlorodifluoromethane (HCFC-22)		<2	2	2	<7	7	7
75-71-8	120.91	Dichlorodifluoromethane (F-12)		<2.5	2.5	2.5	<12.4	12.4	12.4
74-87-3	50.49	Chloromethane		<1.5	1.5	1.5	<3.1	3.1	3.1
76-14-2	170.92	1,2-Dichlorotetrafluoroethane (F-114)		<1.5	1.5	1.5	<10.5	10.5	10.5
75-01-4	62.5	# Vinyl Chloride		<1.5	1.5	1.5	<3.8	3.8	3.8
115-11-7	56.12	Isobutene		<1.5	1.5	1.5	<3.4	3.4	3.4
108-98-0	54.09	1,3-Butadiene		<1.5	1.5	1.5	<3.3	3.3	3.3
74-83-9	94.95	# Bromomethane		<1.5	1.5	1.5	<5.8	5.8	5.8
75-00-3	64.52	# Chloroethane		<1.5	1.5	1.5	<4	4	4
64-17-5	46.07	Ethanol		<2.5	2.5	2.5	<4.7	4.7	4.7
75-05-8	41.05	Acetonitrile		<1.5	1.5	1.5	<2.5	2.5	2.5
107-02-8	56.06	Acrolein		<2.5	2.5	2.5	<5.7	5.7	5.7
	58.08	Acetone + Propanal		<6	6	6	<14	14	14
75-69-4	137.36	# Trichlorofluoromethane (F-11)		<1.5	1.5	1.5	<8.4	8.4	8.4
67-63-0	60.09	2-Propanol		<6	6	6	<15	15	15
109-66-0	72.15	Pentane		<1.5	1.5	1.5	<4.4	4.4	4.4
78-79-5	68.12	Isoprene		<2	2	2	<6	6	6
74-88-4	141.94	Methyl Iodide		<1.5	1.5	1.5	<8.7	8.7	8.7
75-35-4	98.95	1,1-Dichloroethene		<1.5	1.5	1.5	<5.9	5.9	5.9
75-09-2	84.94	Methylene Chloride		<10	10	10	<35	35	35
76-13-1	187.37	# Trichlorotrifluoroethane		<1.5	1.5	1.5	<11.5	11.5	11.5
75-15-0	76.14	Carbon Disulfide		<1.5	1.5	1.5	<4.7	4.7	4.7
71-23-8	60.09	1-Propanol		<1.5	1.5	1.5	<3.7	3.7	3.7
78-85-3	70.09	Methylacrolein		<1.5	1.5	1.5	<4.3	4.3	4.3
75-34-3	98.97	# 1,1-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
287-92-3	70.14	Cyclopentane		<1.5	1.5	1.5	<4.3	4.3	4.3
78-94-4	70.09	Methyl Vinyl Ketone		<1.6	1.6	1.6	<4.6	4.6	4.6
1834-04-4	88.15	Methyl tertiary butyl ether		<1.5	1.5	1.5	<5.4	5.4	5.4
108-05-4	86.09	Vinyl Acetate		<1.5	1.5	1.5	<5.3	5.3	5.3
123-72-8	72.11	Butanal		<2	2	2	<6	6	6
78-93-3	72.1	2-Butanone (MEK)		<2	2	2	<6	6	6
158-59-2	98.94	# cis-1,2-Dichloroethene		<1	1	1	<4	4	4
110-54-3	86.17	Hexane		<1.5	1.5	1.5	<5.3	5.3	5.3
67-66-3	119.39	# Chloroform		<1.5	1.5	1.5	<7.3	7.3	7.3
107-06-2	98.96	# 1,2-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
71-55-6	133.42	# 1,1,1-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
71-38-3	74.12	1-Butanol		<3	3	3	<9	9	9
71-43-2	78.11	# Benzene		<1.5	1.5	1.5	<4.8	4.8	4.8
56-23-5	153.84	# Carbon Tetrachloride		<1.5	1.5	1.5	<9.4	9.4	9.4

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: EASTERN BOUNDARY

Depth:

JE Job No: 12/1752

JE Sample No: 1

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 20 Feb 2012

Date of Receipt: 22 Feb 2012

Date Analysed: 23 Feb 2012

Initial Vacuum (inches Hg)

-30

Final Pressure (psi)

0

PID Reading (ppm)

0

Canister Serial number

481

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
110-82-7	84.16	Cyclohexane		<2	2	2	<7	7	7
107-87-9	86.13	2-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
110-82-3	86.13	Pentanal		<1.5	1.5	1.5	<5.3	5.3	5.3
96-22-0	86.13	3-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
78-87-5	112.99	# 1,2-Dichloropropane		<1.5	1.5	1.5	<6.9	6.9	6.9
75-27-4	163.83	Bromodichloromethane		<1.5	1.5	1.5	<10.1	10.1	10.1
123-91-1	88.11	1,4-Dioxane		<2	2	2	<7	7	7
79-01-6	131.4	# Trichloroethene		<1.5	1.5	1.5	<8.1	8.1	8.1
10081-01-5	110.97	# cis-1,3-Dichloropropene		<1.5	1.5	1.5	<8.8	8.8	8.8
108-10-1	100.16	4-Methyl-2-pentanone		<1.5	1.5	1.5	<6.1	6.1	6.1
10061-02-6	110.97	# trans-1,3-Dichloropropene		<1.5	1.5	1.5	<6.8	6.8	6.8
79-00-5	133.4	# 1,1,2-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
108-88-3	92.13	# Toluene		<1.5	1.5	1.5	<5.7	5.7	5.7
589-38-8	100.16	3-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
591-78-6	100.16	2-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
96-25-1	100.16	Hexanal		<1.5	1.5	1.5	<6.1	6.1	6.1
108-93-4	187.86	# 1,2-Dibromoethane		<1.5	1.5	1.5	<11.5	11.5	11.5
127-18-4	165.85	# Tetrachloroethene		<1.5	1.5	1.5	<10.2	10.2	10.2
108-90-7	112.56	# Chlorobenzene		<1.5	1.5	1.5	<6.9	6.9	6.9
100-41-4	106.16	# Ethylbenzene		<1.5	1.5	1.5	<6.5	6.5	6.5
	106.17	# m&p - Xylenes		<1.5	1.5	1.5	<6.5	6.5	6.5
75-25-2	252.77	Bromoform		<1.5	1.5	1.5	<15.5	15.5	15.5
100-42-5	104.14	# Styrene		<1.5	1.5	1.5	<6.4	6.4	6.4
79-34-5	187.85	# 1,1,2,2-Tetrachloroethane		<1.5	1.5	1.5	<10.3	10.3	10.3
95-47-6	106.17	# o-Xylene		<1.5	1.5	1.5	<6.5	6.5	6.5
108-67-8	120.2	# 1,3,5-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-63-6	120.19	# 1,2,4-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
541-73-1	147.01	# 1,3-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
100-44-7	126.58	Benzyl Chloride		<1.5	1.5	1.5	<7.8	7.8	7.8
108-46-7	147.01	# 1,4-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
526-73-8	120.2	1,2,3-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-50-1	147	# 1,2-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
120-82-1	181.46	# 1,2,4-Trichlorobenzene		<1.5	1.5	1.5	<11.1	11.1	11.1
91-20-3	128.17	Naphthalene		<10	10	10	<52	52	52
		VOC TO15 Total		<142.6	142.6	142.6	<586.9	586.9	586.9
	81	Aliphatic >C4-C6		<10	10	10	<33	33	33
	100	Aliphatic >C6-C8		<10	10	10	<41	41	41
	130	Aliphatic >C8-C10		<10	10	10	<53	53	53
	160	Aliphatic >C10-C12		<10	10	10	<65	65	65

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: WESTERN BOUNDARY

Depth:

JE Job No: 12/1752

JE Sample No: 2

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 20 Feb 2012

Date of Receipt: 22 Feb 2012

Date Analysed: 23 Feb 2012

Initial Vacuum (inches Hg)	-30
Final Pressure (psi)	0
PID Reading (ppm)	0
Canister Serial number	576

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
75-45-6	86.77	Chlorodifluoromethane (HCFC-22)		<2	2	2	<7	7	7
75-71-8	120.91	Dichlorodifluoromethane (F-12)		<2.5	2.5	2.5	<12.4	12.4	12.4
74-87-3	50.49	Chloromethane		<1.5	1.5	1.5	<3.1	3.1	3.1
76-14-2	170.92	1,2-Dichlorotetrafluoroethane (F-114)		<1.5	1.5	1.5	<10.5	10.5	10.5
75-01-4	62.5	# Vinyl Chloride		<1.5	1.5	1.5	<3.8	3.8	3.8
115-11-7	56.12	Isobutene		<1.5	1.5	1.5	<3.4	3.4	3.4
108-98-0	54.09	1,3-Butadiene		<1.5	1.5	1.5	<3.3	3.3	3.3
74-83-9	94.95	# Bromomethane		<1.5	1.5	1.5	<5.8	5.8	5.8
75-00-3	64.52	# Chloroethane		<1.5	1.5	1.5	<4	4	4
64-17-5	46.07	Ethanol		<2.5	2.5	2.5	<4.7	4.7	4.7
75-05-8	41.05	Acetonitrile		<1.5	1.5	1.5	<2.5	2.5	2.5
107-02-8	56.06	Acrolein		<2.5	2.5	2.5	<5.7	5.7	5.7
	58.08	Acetone + Propanal		<6	6	6	<14	14	14
75-69-4	137.36	# Trichlorofluoromethane (F-11)		<1.5	1.5	1.5	<8.4	8.4	8.4
67-63-0	60.09	2-Propanol		<6	6	6	<15	15	15
109-66-0	72.15	Pentane		<1.5	1.5	1.5	<4.4	4.4	4.4
78-79-5	68.12	Isoprene		<2	2	2	<6	6	6
74-88-4	141.94	Methyl Iodide		<1.5	1.5	1.5	<8.7	8.7	8.7
75-35-4	98.95	1,1-Dichloroethene		<1.5	1.5	1.5	<5.9	5.9	5.9
75-09-2	84.94	Methylene Chloride		<10	10	10	<35	35	35
76-13-1	187.37	# Trichlorotrifluoroethane		<1.5	1.5	1.5	<11.5	11.5	11.5
75-15-0	76.14	Carbon Disulfide		<1.5	1.5	1.5	<4.7	4.7	4.7
71-23-8	60.09	1-Propanol		<1.5	1.5	1.5	<3.7	3.7	3.7
78-85-3	70.09	Methylacrolein		<1.5	1.5	1.5	<4.3	4.3	4.3
75-34-3	98.97	# 1,1-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
287-92-3	70.14	Cyclopentane		<1.5	1.5	1.5	<4.3	4.3	4.3
78-94-4	70.09	Methyl Vinyl Ketone		<1.6	1.6	1.6	<4.6	4.6	4.6
1834-04-4	88.15	Methyl tertiary butyl ether		<1.5	1.5	1.5	<5.4	5.4	5.4
108-05-4	86.09	Vinyl Acetate		<1.5	1.5	1.5	<5.3	5.3	5.3
123-72-8	72.11	Butanal		<2	2	2	<6	6	6
78-93-3	72.1	2-Butanone (MEK)		<2	2	2	<6	6	6
158-59-2	98.94	# cis-1,2-Dichloroethene		<1	1	1	<4	4	4
110-54-3	86.17	Hexane		<1.5	1.5	1.5	<5.3	5.3	5.3
67-66-3	119.39	# Chloroform		<1.5	1.5	1.5	<7.3	7.3	7.3
107-06-2	98.96	# 1,2-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
71-55-6	133.42	# 1,1,1-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
71-38-3	74.12	1-Butanol		<3	3	3	<9	9	9
71-43-2	78.11	# Benzene		<1.5	1.5	1.5	<4.8	4.8	4.8
56-23-5	153.84	# Carbon Tetrachloride		<1.5	1.5	1.5	<9.4	9.4	9.4

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: WESTERN BOUNDARY

Depth:

JE Job No: 12/1752

JE Sample No: 2

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 20 Feb 2012

Date of Receipt: 22 Feb 2012

Date Analysed: 23 Feb 2012

Initial Vacuum (inches Hg)

-30

Final Pressure (psi)

0

PID Reading (ppm)

0

Canister Serial number

576

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
110-82-7	84.16	Cyclohexane		<2	2	2	<7	7	7
107-87-9	86.13	2-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
110-82-3	86.13	Pentanal		<1.5	1.5	1.5	<5.3	5.3	5.3
96-22-0	86.13	3-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
78-87-5	112.99	# 1,2-Dichloropropane		<1.5	1.5	1.5	<6.9	6.9	6.9
75-27-4	163.83	Bromodichloromethane		<1.5	1.5	1.5	<10.1	10.1	10.1
123-91-1	88.11	1,4-Dioxane		<2	2	2	<7	7	7
79-01-6	131.4	# Trichloroethene		<1.5	1.5	1.5	<8.1	8.1	8.1
10081-01-5	110.97	# cis-1,3-Dichloropropene		<1.5	1.5	1.5	<8.8	8.8	8.8
108-10-1	100.16	4-Methyl-2-pentanone		<1.5	1.5	1.5	<6.1	6.1	6.1
10061-02-6	110.97	# trans-1,3-Dichloropropene		<1.5	1.5	1.5	<6.8	6.8	6.8
79-00-5	133.4	# 1,1,2-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
108-88-3	92.13	# Toluene		<1.5	1.5	1.5	<5.7	5.7	5.7
589-38-8	100.16	3-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
591-78-6	100.16	2-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
96-25-1	100.16	Hexanal		<1.5	1.5	1.5	<6.1	6.1	6.1
108-93-4	187.86	# 1,2-Dibromoethane		<1.5	1.5	1.5	<11.5	11.5	11.5
127-18-4	165.85	# Tetrachloroethene		<1.5	1.5	1.5	<10.2	10.2	10.2
108-90-7	112.56	# Chlorobenzene		<1.5	1.5	1.5	<6.9	6.9	6.9
100-41-4	106.16	# Ethylbenzene		<1.5	1.5	1.5	<6.5	6.5	6.5
	106.17	# m&p - Xylenes		<1.5	1.5	1.5	<6.5	6.5	6.5
75-25-2	252.77	Bromoform		<1.5	1.5	1.5	<15.5	15.5	15.5
100-42-5	104.14	# Styrene		<1.5	1.5	1.5	<6.4	6.4	6.4
79-34-5	187.85	# 1,1,2,2-Tetrachloroethane		<1.5	1.5	1.5	<10.3	10.3	10.3
95-47-6	106.17	# o-Xylene		<1.5	1.5	1.5	<6.5	6.5	6.5
108-67-8	120.2	# 1,3,5-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-63-6	120.19	# 1,2,4-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
541-73-1	147.01	# 1,3-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
100-44-7	126.58	Benzyl Chloride		<1.5	1.5	1.5	<7.8	7.8	7.8
108-46-7	147.01	# 1,4-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
526-73-8	120.2	1,2,3-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-50-1	147	# 1,2-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
120-82-1	181.46	# 1,2,4-Trichlorobenzene		<1.5	1.5	1.5	<11.1	11.1	11.1
91-20-3	128.17	Naphthalene		<10	10	10	<52	52	52
		VOC TO15 Total		<142.6	142.6	142.6	<586.9	586.9	586.9
	81	Aliphatic >C4-C6		<10	10	10	<33	33	33
	100	Aliphatic >C6-C8		<10	10	10	<41	41	41
	130	Aliphatic >C8-C10		<10	10	10	<53	53	53
	160	Aliphatic >C10-C12		<10	10	10	<65	65	65

Client Name: Atkins

Reference:

Atkins

Location:

ARUNDEL

Contact:

Lucy Hay

Sample ID:

WESTERN BOUNDARY

Depth:

JE Job No:

12/1752

JE Sample No:

2

Matrix:

Air

Method:

TM68 VOCs based on USEPA TO15

Initial Vacuum (inches Hg)

-30

Final Pressure (psi)

0

PID Reading (ppm)

0

Canister Serial number

576

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= **UKAS Accredited**

QF-PM 3.1.13 v3

VOCs - Tentatively Identified Compounds (TICs)

Job number: 12/1752

Method VOC

Sample number: 1

Matrix	Gas
--------	-----

Sample identity: EASTERN BOUNDAR

Sample depth:

Sample Type: Gas

Units: ppbv

note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

Tentative Compound Identification (>80% match)	Retention Time (minutes)	Concentration
Benzene, 1-ethyl-2-methyl-	21.333	147
Nonanal	24.961	383
Decanal	27.208	257
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	27.847	562

VOCs - Tentatively Identified Compounds (TICs)

Job number: 12/1752

Method VOC

Sample number: 2

Matrix	Gas
--------	-----

Sample identity: WESTERN BOUNDARY

Sample depth:

Sample Type: Gas

Units: ppbv

note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

Tentative Compound Identification (>80% match)	Retention Time (minutes)	Concentration
Benzene, 1-ethyl-2-methyl-	21.345	<10
Benzonitrile, 2-(2-hydroxy-5-nitrobenzylidenamino)-	26.385	<10

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 12/1752

SOILS

Please note we are only MCERTS accredited for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. If we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C

WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory. It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.

The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:

\$	Sample temperature on receipt considered inappropriate for analysis requested.
^	Samples exceeding recommended holding times.
&	Samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials).
1	The pH was not tested within 6 hours of sampling and therefore the sample is considered deviating.
~	No sampling date given, unable to confirm if samples are with acceptable holding times.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

NOTE

Data is only accredited when all the requirements of our Quality System have been met. In certain circumstances where the requirements have not been met, the laboratory may issue the data in an interim report but will remove the accreditation, in this instance results should be considered indicative only. Where possible samples will be re-extracted and a final report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

ABBREVIATIONS and ACRONYMS USED

#	UKAS accredited.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance.
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.

JE Job No 12/1752

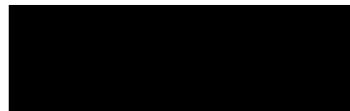
[illegible]



Jones Environmental Laboratory

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Atkins
Ashley Avenue
Epsom
KT18 5AL

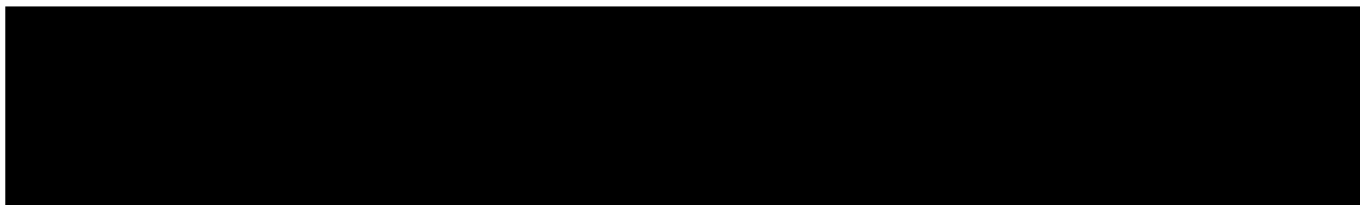


No.4225

Attention : Lucy Hay
Date : 5th March, 2012
Your reference :
Our reference : Test Report 12/2001 Batch 1
Location : ARUNDEL
Date samples received : 1st March, 2012
Status : Final report
Issue : 1

Two samples were received for analysis on 1st March, 2012. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.



J W Farrell- Jones CChem FRSC
Chartered Chemist

Ken Scally MSc FRSC
Technical Director /
Laboratory Manager

Report : Gas

JE Job No.: 12/2001

Please see attached notes for all abbreviations and acronyms

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: WESTERN BOUNDARY

Depth:

JE Job No: 12/2001

JE Sample No: 1

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 28 Feb 2012

Date of Receipt: 1 Mar 2012

Date Analysed: 5 Mar 2012

Initial Vacuum (inches Hg)	-30
Final Pressure (psi)	-5
PID Reading (ppm)	NA
Canister Serial number	608

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
75-45-6	86.77	Chlorodifluoromethane (HCFC-22)		<2	2	2	<7	7	7
75-71-6	120.91	Dichlorodifluoromethane (F-12)		<2.5	2.5	2.5	<12.4	12.4	12.4
74-87-3	50.49	Chloromethane		<1.5	1.5	1.5	<3.1	3.1	3.1
76-14-2	170.92	1,2-Dichlorotetrafluoroethane (F-114)		<1.5	1.5	1.5	<10.5	10.5	10.5
75-01-4	62.5	# Vinyl Chloride		<1.5	1.5	1.5	<3.8	3.8	3.8
115-11-7	56.12	Isobutene		<1.5	1.5	1.5	<3.4	3.4	3.4
106-99-0	54.09	1,3-Butadiene		<1.5	1.5	1.5	<3.3	3.3	3.3
74-83-9	94.95	# Bromomethane		<1.5	1.5	1.5	<5.8	5.8	5.8
75-00-3	64.52	# Chloroethane		<1.5	1.5	1.5	<4	4	4
64-17-5	46.07	Ethanol		<2.5	2.5	2.5	<4.7	4.7	4.7
75-05-8	41.05	Acetonitrile		<1.5	1.5	1.5	<2.5	2.5	2.5
107-02-8	56.06	Acrolein		<2.5	2.5	2.5	<5.7	5.7	5.7
	58.08	Acetone + Propanal		<6	6	6	<14	14	14
75-69-4	137.36	# Trichlorofluoromethane (F-11)		<1.5	1.5	1.5	<8.4	8.4	8.4
67-63-0	60.09	2-Propanol		<6	6	6	<15	15	15
109-86-0	72.15	Pentane		<1.5	1.5	1.5	<4.4	4.4	4.4
78-79-5	68.12	Isoprene		<2	2	2	<6	6	6
74-88-4	141.94	Methyl Iodide		<1.5	1.5	1.5	<8.7	8.7	8.7
75-35-4	96.95	# 1,1-Dichloroethene		<1.5	1.5	1.5	<5.9	5.9	5.9
75-09-2	84.94	Methylene Chloride		<10	10	10	<35	35	35
76-13-1	187.37	# Trichlorotrifluoroethane		<1.5	1.5	1.5	<11.5	11.5	11.5
75-15-0	76.14	Carbon Disulfide		<1.5	1.5	1.5	<4.7	4.7	4.7
71-23-6	60.09	1-Propanol		<1.5	1.5	1.5	<3.7	3.7	3.7
78-85-3	70.09	Methylacrolein		<1.5	1.5	1.5	<4.3	4.3	4.3
75-34-3	98.97	# 1,1-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
287-92-3	70.14	Cyclopentane		<1.5	1.5	1.5	<4.3	4.3	4.3
78-94-4	70.09	Methyl Vinyl Ketone		<1.6	1.6	1.6	<4.6	4.6	4.6
1634-04-4	88.15	Methyl tertiary butyl ether		<1.5	1.5	1.5	<5.4	5.4	5.4
108-05-4	86.09	Vinyl Acetate		<1.5	1.5	1.5	<5.3	5.3	5.3
123-72-8	72.11	Butanal		<2	2	2	<6	6	6
78-93-3	72.1	2-Butanone (MEK)		<2	2	2	<6	6	6
156-59-2	96.94	# cis-1,2-Dichloroethene		<1	1	1	<4	4	4
110-54-3	86.17	Hexane		<1.5	1.5	1.5	<5.3	5.3	5.3
67-66-3	119.39	# Chloroform		<1.5	1.5	1.5	<7.3	7.3	7.3
107-06-2	98.96	# 1,2-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
71-55-6	133.42	# 1,1,1-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
71-36-3	74.12	1-Butanol		<3	3	3	<9	9	9
71-43-2	78.11	# Benzene		<1.5	1.5	1.5	<4.8	4.8	4.8
56-23-5	153.84	# Carbon Tetrachloride		<1.5	1.5	1.5	<9.4	9.4	9.4

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: WESTERN BOUNDARY

Depth:

JE Job No: 12/2001

JE Sample No: 1

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 28 Feb 2012

Date of Receipt: 1 Mar 2012

Date Analysed: 5 Mar 2012

Initial Vacuum (inches Hg)	-30
Final Pressure (psi)	-5
PID Reading (ppm)	NA
Canister Serial number	608

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
110-82-7	84.16	Cyclohexane		<2	2	2	<7	7	7
107-87-9	86.13	2-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
110-62-3	86.13	Pentanal		<1.5	1.5	1.5	<5.3	5.3	5.3
96-22-0	86.13	3-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
75-87-5	112.99	# 1,2-Dichloropropane		<1.5	1.5	1.5	<6.9	6.9	6.9
75-27-4	163.83	Bromodichloromethane		<1.5	1.5	1.5	<10.1	10.1	10.1
123-91-1	88.11	1,4-Dioxane		<2	2	2	<7	7	7
79-01-6	131.4	# Trichloroethene		<1.5	1.5	1.5	<8.1	8.1	8.1
10061-01-5	110.97	# cis-1,3-Dichloropropene		<1.5	1.5	1.5	<6.8	6.8	6.8
108-10-1	100.16	4-Methyl-2-pentanone		<1.5	1.5	1.5	<6.1	6.1	6.1
10061-02-6	110.97	# trans-1,3-Dichloropropene		<1.5	1.5	1.5	<6.8	6.8	6.8
79-00-5	133.4	# 1,1,2-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
108-68-3	92.13	# Toluene		<1.5	1.5	1.5	<5.7	5.7	5.7
589-38-8	100.16	3-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
591-78-6	100.16	2-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
66-25-1	100.16	Hexanal		<1.5	1.5	1.5	<6.1	6.1	6.1
105-93-4	187.86	# 1,2-Dibromoethane		<1.5	1.5	1.5	<11.5	11.5	11.5
127-18-4	165.85	# Tetrachloroethene		<1.5	1.5	1.5	<10.2	10.2	10.2
108-90-7	112.56	# Chlorobenzene		<1.5	1.5	1.5	<6.9	6.9	6.9
100-41-4	106.16	# Ethylbenzene		<1.5	1.5	1.5	<6.5	6.5	6.5
	106.17	# m&p - Xylenes		<1.5	1.5	1.5	<6.5	6.5	6.5
75-25-2	252.77	Bromoform		<1.5	1.5	1.5	<15.5	15.5	15.5
100-42-5	104.14	# Styrene		<1.5	1.5	1.5	<6.4	6.4	6.4
79-34-5	167.85	# 1,1,2,2-Tetrachloroethane		<1.5	1.5	1.5	<10.3	10.3	10.3
95-47-6	106.17	# o-Xylene		<1.5	1.5	1.5	<6.5	6.5	6.5
108-67-8	120.2	# 1,3,5-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-63-6	120.19	# 1,2,4-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
541-73-1	147.01	# 1,3-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
100-44-7	126.58	Benzyl Chloride		<1.5	1.5	1.5	<7.8	7.8	7.8
105-46-7	147.01	# 1,4-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
526-73-8	120.2	1,2,3-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-50-1	147	# 1,2-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
120-82-1	181.46	# 1,2,4-Trichlorobenzene		<1.5	1.5	1.5	<11.1	11.1	11.1
91-20-3	128.17	Naphthalene		<10	10	10	<52	52	52
		Sum of VOC TO15 compounds		0			0		
	81	Aliphatic >C4-C6		11	10	10	36	33	33
	100	Aliphatic >C6-C8		21	10	10	86	41	41
	130	Aliphatic >C8-C10		<10	10	10	<53	53	53
	160	Aliphatic >C10-C12		<10	10	10	<65	65	65

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: EASTERN BOUNDARY

Depth:

JE Job No: 12/2001

JE Sample No: 2

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 28 Feb 2012

Date of Receipt: 1 Mar 2012

Date Analysed: 5 Mar 2012

Initial Vacuum (inches Hg)	-30
Final Pressure (psi)	-5
PID Reading (ppm)	NA
Canister Serial number	663

Q - Qualifiers

B = Indicates analyte found in associated method blank

++ = Indicates value exceeds calibration range

Key

MDL = Method Detection Limit

RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
75-45-6	86.77	Chlorodifluoromethane (HCFC-22)		<2	2	2	<7	7	7
75-71-6	120.91	Dichlorodifluoromethane (F-12)		<2.5	2.5	2.5	<12.4	12.4	12.4
74-87-3	50.49	Chloromethane		<1.5	1.5	1.5	<3.1	3.1	3.1
76-14-2	170.92	1,2-Dichlorotetrafluoroethane (F-114)		<1.5	1.5	1.5	<10.5	10.5	10.5
75-01-4	62.5	# Vinyl Chloride		<1.5	1.5	1.5	<3.8	3.8	3.8
115-11-7	56.12	Isobutene		<1.5	1.5	1.5	<3.4	3.4	3.4
106-99-0	54.09	1,3-Butadiene		<1.5	1.5	1.5	<3.3	3.3	3.3
74-83-9	94.95	# Bromomethane		<1.5	1.5	1.5	<5.8	5.8	5.8
75-00-3	64.52	# Chloroethane		<1.5	1.5	1.5	<4	4	4
64-17-5	46.07	Ethanol		<2.5	2.5	2.5	<4.7	4.7	4.7
75-05-8	41.05	Acetonitrile		<1.5	1.5	1.5	<2.5	2.5	2.5
107-02-8	56.06	Acrolein		<2.5	2.5	2.5	<5.7	5.7	5.7
	58.08	Acetone + Propanal		<6	6	6	<14	14	14
75-69-4	137.36	# Trichlorofluoromethane (F-11)		<1.5	1.5	1.5	<8.4	8.4	8.4
67-63-0	60.09	2-Propanol		<6	6	6	<15	15	15
109-66-0	72.15	Pentane		<1.5	1.5	1.5	<4.4	4.4	4.4
78-79-5	68.12	Isoprene		<2	2	2	<6	6	6
74-88-4	141.94	Methyl Iodide		<1.5	1.5	1.5	<8.7	8.7	8.7
75-35-4	96.95	# 1,1-Dichloroethene		<1.5	1.5	1.5	<5.9	5.9	5.9
75-09-2	84.94	Methylene Chloride		<10	10	10	<35	35	35
76-13-1	187.37	# Trichlorotrifluoroethane		<1.5	1.5	1.5	<11.5	11.5	11.5
75-15-0	76.14	Carbon Disulfide		<1.5	1.5	1.5	<4.7	4.7	4.7
71-23-6	60.09	1-Propanol		<1.5	1.5	1.5	<3.7	3.7	3.7
78-85-3	70.09	Methylacrolein		<1.5	1.5	1.5	<4.3	4.3	4.3
75-34-3	98.97	# 1,1-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
287-92-3	70.14	Cyclopentane		<1.5	1.5	1.5	<4.3	4.3	4.3
78-94-4	70.09	Methyl Vinyl Ketone		<1.6	1.6	1.6	<4.6	4.6	4.6
1634-04-4	88.15	Methyl tertiary butyl ether		<1.5	1.5	1.5	<5.4	5.4	5.4
108-05-4	86.09	Vinyl Acetate		<1.5	1.5	1.5	<5.3	5.3	5.3
123-72-8	72.11	Butanal		<2	2	2	<6	6	6
78-93-3	72.1	2-Butanone (MEK)		<2	2	2	<6	6	6
156-59-2	96.94	# cis-1,2-Dichloroethene		<1	1	1	<4	4	4
110-54-3	86.17	Hexane		<1.5	1.5	1.5	<5.3	5.3	5.3
67-66-3	119.39	# Chloroform		<1.5	1.5	1.5	<7.3	7.3	7.3
107-06-2	98.96	# 1,2-Dichloroethane		<1.5	1.5	1.5	<6.1	6.1	6.1
71-55-6	133.42	# 1,1,1-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
71-36-3	74.12	1-Butanol		<3	3	3	<9	9	9
71-43-2	78.11	# Benzene		<1.5	1.5	1.5	<4.8	4.8	4.8
56-23-5	153.84	# Carbon Tetrachloride		<1.5	1.5	1.5	<9.4	9.4	9.4

Jones Environmental Laboratory

Client Name: Atkins

Reference:

Location: ARUNDEL

Contact: Lucy Hay

Sample ID: EASTERN BOUNDARY

Depth:

JE Job No: 12/2001

JE Sample No: 2

Matrix: Air

Method: TM68 VOCs based on USEPA TO15

Sample Date: 28 Feb 2012

Date of Receipt: 1 Mar 2012

Date Analysed: 5 Mar 2012

Initial Vacuum (inches Hg)	-30
Final Pressure (psi)	-5
PID Reading (ppm)	NA
Canister Serial number	663

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Key

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RL = Reporting Limit

= UKAS Accredited

Cas No	Molecular Weight	Compound	Q	Result	RL	MDL	Result	RL	MDL
				ppbv	ppbv	ppbv	ug/m ³	ug/m ³	ug/m ³
110-82-7	84.16	Cyclohexane		<2	2	2	<7	7	7
107-87-9	86.13	2-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
110-62-3	86.13	Pentanal		<1.5	1.5	1.5	<5.3	5.3	5.3
96-22-0	86.13	3-Pentanone		<1.5	1.5	1.5	<5.3	5.3	5.3
75-87-5	112.99	# 1,2-Dichloropropane		<1.5	1.5	1.5	<6.9	6.9	6.9
75-27-4	163.83	Bromodichloromethane		<1.5	1.5	1.5	<10.1	10.1	10.1
123-91-1	88.11	1,4-Dioxane		<2	2	2	<7	7	7
79-01-6	131.4	# Trichloroethene		<1.5	1.5	1.5	<8.1	8.1	8.1
10061-01-5	110.97	# cis-1,3-Dichloropropene		<1.5	1.5	1.5	<6.8	6.8	6.8
108-10-1	100.16	4-Methyl-2-pentanone		<1.5	1.5	1.5	<6.1	6.1	6.1
10061-02-6	110.97	# trans-1,3-Dichloropropene		<1.5	1.5	1.5	<6.8	6.8	6.8
79-00-5	133.4	# 1,1,2-Trichloroethane		<1.5	1.5	1.5	<8.2	8.2	8.2
108-68-3	92.13	# Toluene		<1.5	1.5	1.5	<5.7	5.7	5.7
589-38-8	100.16	3-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
591-78-6	100.16	2-Hexanone		<1.5	1.5	1.5	<6.1	6.1	6.1
66-25-1	100.16	Hexanal		<1.5	1.5	1.5	<6.1	6.1	6.1
105-93-4	187.86	# 1,2-Dibromoethane		<1.5	1.5	1.5	<11.5	11.5	11.5
127-18-4	165.85	# Tetrachloroethene		<1.5	1.5	1.5	<10.2	10.2	10.2
108-90-7	112.56	# Chlorobenzene		<1.5	1.5	1.5	<6.9	6.9	6.9
100-41-4	106.16	# Ethylbenzene		<1.5	1.5	1.5	<6.5	6.5	6.5
	106.17	# m&p - Xylenes		<1.5	1.5	1.5	<6.5	6.5	6.5
75-25-2	252.77	Bromoform		<1.5	1.5	1.5	<15.5	15.5	15.5
100-42-5	104.14	# Styrene		<1.5	1.5	1.5	<6.4	6.4	6.4
79-34-5	167.85	# 1,1,2,2-Tetrachloroethane		<1.5	1.5	1.5	<10.3	10.3	10.3
95-47-6	106.17	# o-Xylene		<1.5	1.5	1.5	<6.5	6.5	6.5
108-67-8	120.2	# 1,3,5-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-63-6	120.19	# 1,2,4-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
541-73-1	147.01	# 1,3-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
100-44-7	126.58	Benzyl Chloride		<1.5	1.5	1.5	<7.8	7.8	7.8
105-46-7	147.01	# 1,4-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
526-73-8	120.2	1,2,3-Trimethylbenzene		<1.5	1.5	1.5	<7.4	7.4	7.4
95-50-1	147	# 1,2-Dichlorobenzene		<1.5	1.5	1.5	<9	9	9
120-82-1	181.46	# 1,2,4-Trichlorobenzene		<1.5	1.5	1.5	<11.1	11.1	11.1
91-20-3	128.17	Naphthalene		<10	10	10	<52	52	52
		Sum of VOC TO15 compounds		0			0		
	81	Aliphatic >C4-C6		<10	10	10	<33	33	33
	100	Aliphatic >C6-C8		<10	10	10	<41	41	41
	130	Aliphatic >C8-C10		<10	10	10	<53	53	53
	160	Aliphatic >C10-C12		<10	10	10	<65	65	65

Method VOC

Matrix	Gas
--------	-----

Tentative Compound Identification (>80% match)	Retention Time (minutes)	Concentration
Manganese(II) acetate	6.917	15
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	27.847	13

VOCs - Tentatively Identified Compounds (TICs)

Job number: 12/2001
 Sample number: 2
 Sample identity: EASTERN BOUNDARY
 Sample depth:
 Sample Type: Gas
 Units: ppbv

Method VOC
 Matrix Gas

note: Only samples with TICs (if requested) are reported. If TICs were requested but no compounds found they are not reported.

Tentative Compound Identification (>80% match)	Retention Time (minutes)	Concentration
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	27.847	12

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 12/2001

SOILS

Please note we are only MCERTS accredited for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. If we are instructed to keep samples, a storage charge of £1 (1.5 Euros) per sample per month will be applied until we are asked to dispose of them.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C

WATERS

Please note we are not a Drinking Water Inspectorate (DWI) Approved Laboratory. It is important that detection limits are carefully considered when requesting water analysis.

UKAS accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any analysis that may be compromised highlighted on your schedule/ report by the use of a symbol.

The use of any of the following symbols indicates that the sample was deviating and the test result may be unreliable:

\$	Sample temperature on receipt considered inappropriate for analysis requested.
^	Samples exceeding recommended holding times.
&	Samples received in inappropriate containers (e.g. volatile samples not submitted in VOC jars/vials).
†	The pH was not tested within 6 hours of sampling and therefore the sample is considered deviating.
~	No sampling date given, unable to confirm if samples are with acceptable holding times.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

NOTE

Data is only accredited when all the requirements of our Quality System have been met. In certain circumstances where the requirements have not been met, the laboratory may issue the data in an interim report but will remove the accreditation, in this instance results should be considered indicative only. Where possible samples will be re-extracted and a final report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

ABBREVIATIONS and ACRONYMS USED

#	UKAS accredited.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance.
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.

JE Job No 12/2001

[illegible]



Certificate of Analysis

CHEMEX
The Business of Science

Chemex Report Number: 12B36A- BTEX MS

Client Name and Address: Lucy Hay
Atkins
Sir William Atkins House
Ashley Avenue
Epsom, Surrey
KT18 5AL

Project Code: ARUNDEL
Chemex Quote No: CB120209/E110627
Order No: 12156160

Date of Sample Receipt: 01 March 2012
Turnaround: Standard

Any opinions or interpretations expressed in this report are outside the scope of UKAS accreditation.

No guarantees are given that this data is representative of the whole or any other part of the site from which the samples originated. Tests covered by this certificate were conducted in accordance with Chemex method procedures, which may not accord in every detail with published methods.

Should this report require incorporation into client report, it must be used in its entirety.

Any queries regarding this report should be addressed in the first instance, to our client liaison officers, contact details as below.

Authorised:



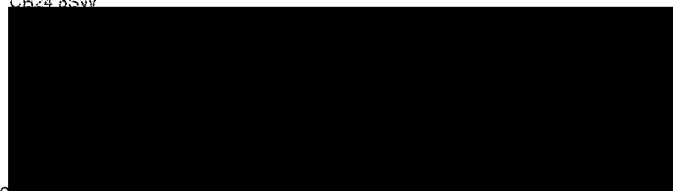
Julian Froment BSc Hons MInstP
Project Manager

Dorota Mielnikonis MSc
Quality Assurance Department.

Date report issued:

15 March 2012

CHEMEX ENVIRONMENTAL INTERNATIONAL LTD
Environmental Analysis and Ecotoxicology
Unit J, Broad Lane Industrial Estate
Cottenham
Cambridge
CB24 8SW



Sample Receipt Date:	Time:	SDG:
01 MARCH 2012	08:50	A

TABLE OF SAMPLES ANALYSED

Sampling Date / Time:	Analysis Date	Within Holding Time?	Client ID:	Bottle No:	Lab ID:	Matrix:
20-28-Feb-12	02-Mar-12	Yes	WESTERN BOUNDARY-1	F073256	12B36A01X	AIR
20-28-Feb-12	02-Mar-12	Yes	NORTHERN BOUNDARY-1	A77662	12B36A02X	AIR
20-28-Feb-12	02-Mar-12	Yes	SOUTHERN BOUNDARY-1	G0167264	12B36A03X	AIR
20-28-Feb-12	02-Mar-12	Yes	CENTRE-1	G0124133	12B36A04X	AIR
20-28-Feb-12	02-Mar-12	Yes	EASTERN BOUNDARY-1	E057149	12B36A05X	AIR

PROJECT NOTES

The samples arrived at Chemex at an ambient temperature.

Tenax Tube analysis:

This analysis was carried out using our new Perkin Elmer Automated Thermal Desorption unit (ATD). We are still in the process of carrying out validation on this new piece of analytical equipment, and hope that this will provide an improved analytical method for the analysis of air samples.

CHEMEX ENVIRONMENTAL INTERNATIONAL
VOLATILE ORGANICS IN AIR

Project No :		12B36A	Project code:		ARUNDEL	Turnaround:		STD
14 Mar 12 14:19								
Lab Sample ID :		12B36A01X	12B36A02X		12B36A03X	12B36A04X		12B36A05X
Client ID :		WESTERN BOUNDARY-1	NORTHERN BOUNDARY-1		SOUTHERN BOUNDARY-1	CENTRE-1		EASTERN BOUNDARY-1
Bottle No :		F073256	A77662		G0167264	G0124133		E057149
Matrix :		AIR	AIR		AIR	AIR		AIR
Volume/Weight :		Whole tube	Whole tube		Whole tube	Whole tube		Whole tube
Sample Litres Pumped :								
Scaling Factor :		1.0	1.0		1.0	1.0		1.0
COMPOUND					Concentration ng/Tube			
Benzene		17	32		17	13		14
Toluene		36	11		21	12		12
Ethylbenzene		17	4		4	<4		<4
m&p-Xylene		41	13		13	<8		<8
o-Xylene		17	5		6	<4		<4

APPENDIX 1

POINTS TO NOTE

1. The data for all soil samples are expressed as the dry weight concentration. With the exception of metals analysis samples are analysed on an 'as submitted' basis. Data for soils and similar solid samples are calculated on the basis of dry weight (drying temperature 105°C) according to the SOP 1190.

For metals analyses, soil samples are air dried at <30°C overnight, crushed and sieved through a 250µm sieve before taking a sub-sample for digestion (some volatile species may be lost during this process). The digestion of samples on an 'as received' basis are carried out only when requested by the client.

Metals analysis carried out on a filtered and acid digested water sample represents environmentally available metals. Metals analysis carried out on an unfiltered and acid digested water sample represents total metals. Metals analysis carried out on a filtered (not acid digested) water sample represents dissolved metals.

2. Sample data for all matrices are presented without correction for surrogate or spike recovery or any concentrations detected in the method blank unless indicated in the Project Notes.
3. Sample duplicates, matrix spike or matrix spike duplicates will be run upon request, but an additional charge may be incurred.
4. Whilst Chemex hold MCERTS accreditation for sand, loam and clay, or any material where these constitute the major part of the sample, other materials would require additional validation and quality control to satisfy the MCERTS Standard. Any data failing to comply with the MCERTS Standard will be flagged or identified in the Project Notes. Occasionally, the nature of samples will result in data being generated that fails to satisfy the requirements of the MCERTS Standard. Moreover, under certain circumstances, the level of analytes present or the sample matrix may make it necessary to adopt modified procedures. Full details of such changes and the subsequent effect upon accreditation status will be recorded in the Project Notes.
5. Data in this report have been presented in the Chemex less than (<) the scaled method detection limit (MDL) format. This format reports concentrations detected below the MDL as < the appointed scaled MDL for a particular compound, having taken into account any dilutions, weights or volumes taken and percent moisture as applicable.
6. Method Detection Limit (MDL) is the minimum concentration of the analyte in a sample that can be detected with a prescribed level of confidence of distinguishing the concentration from a background signal.
7. In order to be able to make a valid comparison of the sample data with blank levels, account has to be taken of the applied scaling factor. Unless stated in the project notes all MDL values in the report are already scaled.
8. The laboratory takes a representative sub sample from the received sample. Large stones, organic substances etc. are removed from the soil samples. Where water samples contain sediment, the sample is decanted and the sediment not included in the extraction process.
9. The US EPA recommended temperature range for sample storage is $4 \pm 2^\circ\text{C}$.
10. Where dates of analysis for each parameter are not routinely included in the report, they are available upon request.
11. Whilst Chemex endeavours to meet requested turnarounds times wherever possible, these cannot be guaranteed. Clients will be informed if there is any likelihood of turnaround times not being met.
12. Chemex recommended holding times, within this report referred to as *Holding Times*, are based on published international standards/ guidelines, in-house experimentally validated periods or where no other advice is available estimated and should be used solely for guidance. Chemex makes no claim regarding the appropriateness of holding times or the effect of varying holding times on sample integrity.



Certificate of Analysis

CHEMEX
The Business of Science

Chemex Report Number: 12C34A- BTEX

Client Name and Address: Lucy Hay
Atkins
Sir William Atkins House
Ashley Avenue
Epsom, Surrey
KT18 5AL

Project Code: ARUNDEL
Chemex Quote No: CB120209/E110627
Order No: 12156160

Date of Sample Receipt: 13 March 2012
Turnaround: Standard

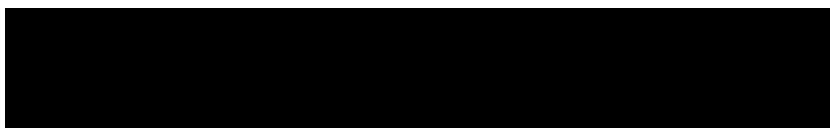
Any opinions or interpretations expressed in this report are outside the scope of UKAS accreditation.

No guarantees are given that this data is representative of the whole or any other part of the site from which the samples originated. Tests covered by this certificate were conducted in accordance with Chemex method procedures, which may not accord in every detail with published methods.

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Authorised:



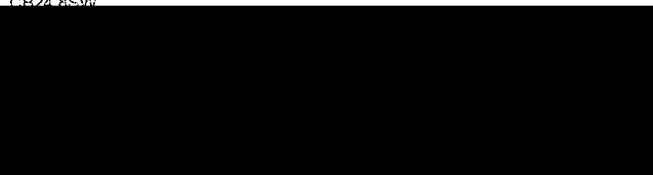
Julian Froment BSc Hons MInstP
Project Manager

Dorota Mielnikonis MSc
Quality Assurance Department.

Date report issued:

23 March 2012

CHEMEX ENVIRONMENTAL INTERNATIONAL LTD
Environmental Analysis and Ecotoxicology
Unit J, Broad Lane Industrial Estate
Cottenham
Cambridge
CB24 8SW



Sample Receipt Date:	Time:	SDG:
13 MARCH 2012	12:10	A

TABLE OF SAMPLES ANALYSED

Sampling Date / Time:	Analysis Date	Within Holding Time?	Client ID:	Bottle No:	Lab ID:	Matrix:
05-Mar-12	18-Mar-12	Yes	Northern Boundry-2	G0146294	12C34A01X	AIR
05-Mar-12	18-Mar-12	Yes	Eastern Boundry-2	E064699	12C34A02X	AIR
05-Mar-12	18-Mar-12	Yes	Southern Boundry-2	G0166259	12C34A03X	AIR
05-Mar-12	18-Mar-12	Yes	Western Boundry-2	D026742	12C34A04X	AIR
05-Mar-12	19-Mar-12	Yes	Centre-2	E064617	12C34A05X	AIR

PROJECT NOTES

The samples arrived at Chemex at ambient temperature.

The sampling times were not recorded.

Tenax Tube analysis:

This analysis was carried out using our new Perkin Elmer Automated Thermal Desorption unit (ATD). We are still in the process of carrying out validation on this new piece of analytical equipment, and hope that this will provide an improved analytical method for the analysis of air samples.

CHEMEX ENVIRONMENTAL INTERNATIONAL
VOLATILE ORGANICS IN AIR

Project No :		12C34A		Project code:		ARUNDEL		Turnaround:		STD	
23 Mar 12 10:42											
Lab Sample ID :		12C34A01X		12C34A02X		12C34A03X		12C34A04X		12C34A05X	
Client ID :		NORTHERN BOUNDARY-2		EASTERN BOUNDARY-2		SOUTHERN BOUNDARY-2		WESTERN BOUNDARY-2		CENTRE-2	
Bottle No :		G0146294		E064699		G0166259		D026742		E064617	
Matrix :		AIR		AIR		AIR		AIR		AIR	
Volume/Weight :		Whole tube		Whole tube		Whole tube		Whole tube		Whole tube	
Sample Litres Pumped :											
Scaling Factor :		1.0		1.0		1.0		1.0		1.0	
COMPOUND						Concentration ng/Tube					
Benzene		5		7		6		15		12	
Toluene		<5		<5		<5		<5		<5	
Ethylbenzene		<4		<4		<4		<4		<4	
m&p-Xylene		<8		<8		<8		<8		<8	
o-Xylene		<4		<4		<4		<4		<4	

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Appendix C. Topography Survey Information

Drawing Title	Drawing No.	Author	Revision	Issued Date
Healey Road, Ossett Topographical Survey	00/118/01/0 B.G Arundel	Warner Land Surveys Limited	--	June 2000

