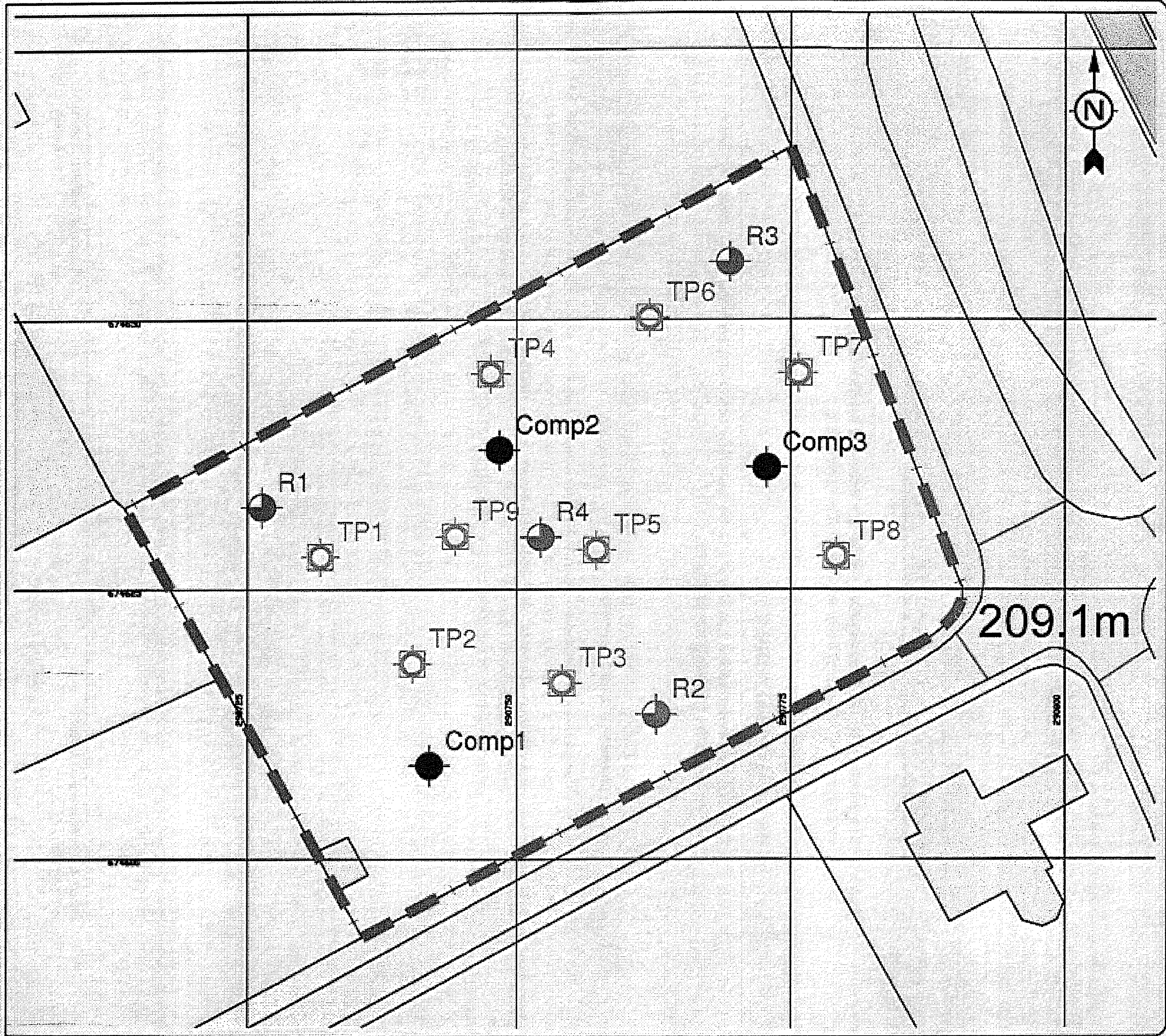

NOTES

Site boundary	Site boundary
TP1 to TP9	Trial pit excavated by Mason Evans Partnership (January 2013)
Comp1 to Comp3	Borehole sunk by Aitken Laboratories Limited (January 2013)
R1 to R4	Rotary borehole sunk by GB Land Engineering (January 2013)

REV	DATE	DETAILS

PRO-CONSTRUCTION LIMITED
4 MOUNTBLATTEN PLACE
ROSYTH
KY11 2HL

PROJECT TITLE

GREYRIGGS
CALIFORNIA, FALKIRK

DRAWING TITLE

SITE INVESTIGATION
LOCATION PLAN

DRAWN BY	CHK'D BY	APP'D BY	DATE	SCALES
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PROJECT No.	DRAWING No.	REVISION
G2012/356	G2012/356/SI/R/F/08	

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- In selecting the appropriate samples for testing, we have taken cognisance of a number of factors, including the proposed site use. Sampling rationale has been determined in accordance with R&D Technical Report P5-066/TR Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination, as indicated in the table below.

Rationale for Sampling at Different Depths	
Depth Range	**Rationale**
Ground Level – 1.0 m	To assess: • Human/ animal intake arising from ingestion and dermal contact. • Potential for wind entrainment leading to inhalation (of contaminated soils and dusts) or deposition onto neighbouring land. • Surface water run-off (e.g. due to flash flooding). • Uptake by shallow rooting plants (e.g. crops, ornamental and wild species). • Surface leaching to groundwater.
>1.0 m in made or natural ground	To assess: • Intake via ingestion/ inhalation/ dermal contact arising from 'abnormal' (or unpredicted) excavation (e.g. children digging dens) or for other purposes such as swimming pools, ponds, house extensions. • Uptake by deep rooting shrubs or trees. • Intake by or arising from the activities of burrowing animals. • Intake arising from construction/ maintenance of buildings and services, for example: a. Foundations (usually within 2.0 m of final formation level). b. Water supply pipes, telecommunications, gas and power (0.5 m to 1.0 m of final formation levels). c. Sewers (from 0.5 m to >1.0 m of final formation level). • To locate perched water of groundwater. • To confirm depth of made ground. • To locate possible lateral pathways for gas or vapour migration in made ground. • To establish the extent of any leaching of soluble constituents from superficial soils. • To detect 'deep' contamination (e.g. gas generating materials, leachable materials, dense solvents located above an impermeable stratum). • To obtain information on 'background' soil properties. • To locate 'natural' lateral migration pathways.

- The scope of the testing implemented considered the interpreted origin of the materials in association with their description. This is consistent with best practice under current contaminated land guidance. The chemical condition of these materials was assessed for a wide spectrum of potential contaminants, comprising a broad range of common organic and inorganic substances primarily of a toxic or phytotoxic nature.

- During sample collection, relevant information such as notes of field observations has been logged before transferring the samples to laboratory-prepared sample bottles. Care has also been taken to minimise the aeration of samples during transfer to the bottles;

4.0 INVESTIGATION RESULTS

4.1 GROUND CONDITIONS

4.1.1 The ground conditions encountered during the investigation were generally consistent with the anticipated sequence of strata indicated by the desk study information. The upper soils were noted to be made ground overlying glacial till.

Soils Encountered

4.1.2 Made ground was recorded in all of the exploratory holes at the site. It was described as an upper layer of brown mottled orange sandy slightly gravely clayey topsoil with occasional cobbles with fragments of plastic and shale. In trial pit 5 tree branches were recorded. It varied in thickness from 0.1m to greater than 2.2m, with a base recorded at 2.45m in trial pit TP03. The thickness of the made ground at each investigation location are indicated on Drawing No G2012/356/SI/R/F/09. The underlying natural soils were noted to be glacial till and were generally described as soft varying to stiff consistency grey sandy gravelly CLAY with cobbles. It is considered the soft soils may be representative of locally softening due to the previous presence of a reservoir. Significant boulders were recorded within the soils at a few locations.

Solid Strata

4.1.3 Rockhead was recorded at 19.8 m to 21.5 m depth. The solid strata were recorded to comprise of intact sandstones and mudstones. Borehole R3, however, recorded a void from 21.0 m to 23.0 m, which is interpreted to be workings in the Lower Drumgray Coal.

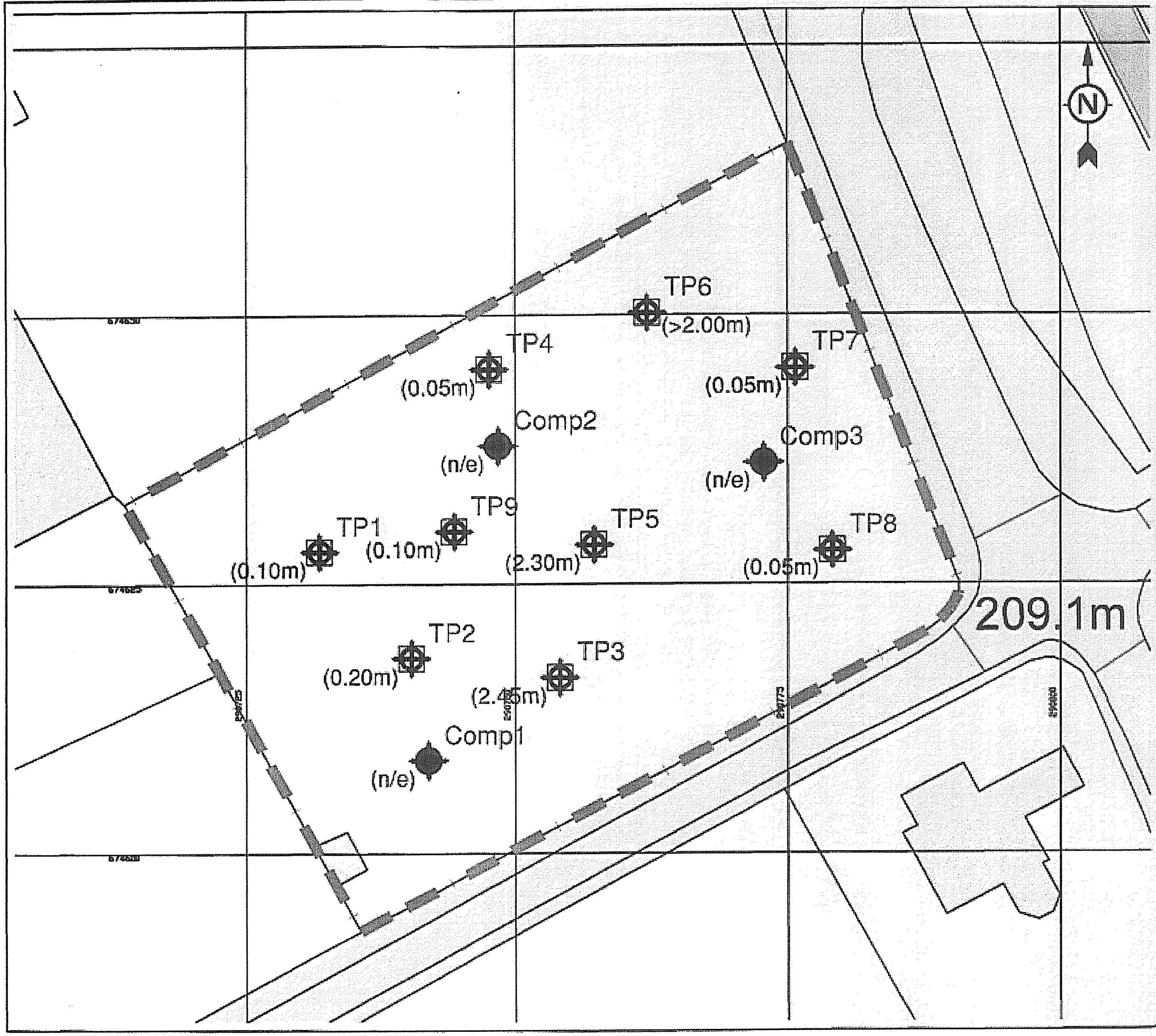
4.2 GROUNDWATER

4.2.1 Groundwater ingress was noted in a number of trial pits both within the made ground deposits and occasionally within the natural soils at depths varying from 1.4m to 2.2m

4.2.2 During subsequent water level monitoring depths to groundwater was noted to vary from 0.1m to 0.9m, indicating that the boreholes may have been flooded on occasion as the boreholes were sunk with clay deposits which were recorded to be dry.

4.3 VISUAL/OLFACTORY EVIDENCE OF CONTAMINATION

4.3.1 There was no visual or olfactory evidence of contamination recorded during works.



NOTES

Site boundary

TP1 to TP9 — Trial pit excavated by Mason Evans Partnership (January 2013)

Comp1 to Comp3 — Borehole sunk by Aitken Laboratories Limited (January 2013)

(0.10m) — Recorded made ground thicknesses (m)

REV	DATE	DETAILS

PRO-CONSTRUCTION LIMITED
4 MOUNTBLATTEN PLACE
ROSYTH
KY11 2HL

PROJECT TITLE

GREYRIGGS
CALIFORNIA, FALKIRK

DRAWING TITLE

RECORDED MADE GROUND THICKNESSES

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PROJECT No.	DRAWING No.	REVISION
G2012/356	G2012/356/SI/R/F/09	

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5.0 CONTAMINATION RISK ASSESSMENT

5.1 HUMAN HEALTH AND GROUNDWATER RISK ASSESSMENT SCREENING CRITERIA

5.1.1 Consideration of analytical results against applicable, conservative risk based screening criteria has been used to provide an assessment of risk. A tiered risk based approach comprises:

- Preliminary Risk Assessment (e.g. establishing potential pollutant linkages);
- Generic Quantitative Risk Assessment (GQRA) (e.g. the comparison of contaminant concentrations against Soil Guideline Values (SGV) or other Generic Assessment Criteria (GAC)); and
- Detailed Quantitative Risk Assessment (DQRA) (e.g. the comparison of contaminant concentrations against site specific assessment criteria).

5.1.2 A GQRA has been carried out as part of this assessment, although the Preliminary Risk Assessment indicated no significant contaminant source to be present. Soil data has been assessed in terms of risks to human health and groundwater data assessed in terms of risks to the water environment. We have utilised conservative guideline values representing the proposed commercial end-use.

5.2 STATISTICAL ANALYSIS OF DATA

5.2.1 Where appropriate, chemical data for soils can be considered statistically in general accordance with the guidelines given in the Chartered Institute of Environmental Health Publication *Guidance on comparing Soil Contamination Data with a Critical Concentration* (May 2008).

Sample Depths

5.2.2 At the generic assessment stage, it should be assumed that all pathways contained within the generic model applied will be active. In reality, unless a contaminant is volatile (e.g. organic), exposure by direct contact will likely be mitigated by the depth of the contaminant or available surface cover. Generally, direct contact with contaminants at greater than 600 mm depth or under hardstanding is highly unlikely to occur unless the ground is to be disturbed through removal of surfacing or earthworks.

5.3 GROUND GAS ASSESSMENT

5.3.1 The potential presence of carbon dioxide and methane at the target site have been appraised in compliance with CIRIA document, *Assessing Risks Posed by Hazardous Gases to Buildings (Report C665)* and NHBC document *Guidance on Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present (No. 4 March 2007)*. These documents detail site investigations methodologies and risk assessment procedures for assessing the results from such investigations. The risk assessment procedures are primarily based on those detailed by Wilson and Card (1999).

5.4 BUILDING MATERIALS ASSESSMENT

5.4.1 We have undertaken preliminary soil testing based on UKWIR guidance to allow a Scottish Water connection. Further consideration has also been given to BRE Special Digest 1 Concrete in Aggressive Ground.

6.0 HUMAN HEALTH RISK ASSESSMENT

6.1 CONTAMINANTS IN SOILS

6.1.1 The results of analysis for a range of contaminants have been compared directly to their respective Generic Assessment Criteria. No exceedences have been noted that are considered as warranting remedial intervention. The results are outlined below and are included in Appendix 5.

Exceedence of Guideline Levels (Residential End-Use With Consumption of Home-grown Produce)

Contaminant	Effect	Measured Concentrations in Excess of SGV/GSV/SSTL (mg/kg)	Measured Exceedence Concentrations (mg/kg)	SGV/GSV/SSV (mg/kg)	Source
		Made Ground	Made Ground		
Arsenic	Toxic	0 out of 3	-	32	CLEA
Mercury (Inorganic)	Toxic	0 out of 3	-	170	CLEA
Chromium III	Toxic	0 out of 3	-	11800	ATRISK
Chromium VI	Toxic	0 out of 3	-	14.2	ATRISK
Lead	Toxic	0 out of 3	-	276	ATRISK
Cadmium	Toxic	0 out of 3	-	10	ATRISK
Selenium	Toxic	0 out of 3	-	350	CLEA
Nickel	Toxic	0 out of 3	-	130	CLEA
Nickel	Phytotoxic	0 out of 3	-	200	MAFF
Copper	Toxic	0 out of 3	-	3970	ATRISK
Copper	Phytotoxic	0 out of 3	-	135	MAFF
Zinc	Toxic	0 out of 3	-	16900	ATRISK
Zinc	Phytotoxic	0 out of 3	- -	300	MAFF
Total Sulphate	Phytotoxic	0 out of 3	- -	10000	SAC
Phenol (index)	Toxic	0 out of 3	- -	162	CLEA
Aliphatic C5-C6	Toxic	0 out of 3	- -	30.1	ATRISK
Aliphatic C6-C8	Toxic	0 out of 3	- -	69.8	ATRISK
Aliphatic C8-C10	Toxic	0 out of 3	- -	9.79	ATRISK
Aliphatic C10-C12	Toxic	0 out of 3	-	49.9	ATRISK
Aliphatic C12-C16	Toxic	0 out of 3	-	21	ATRISK
Aliphatic C16-C35	Toxic	0 out of 3	-	145000	ATRISK
Aromatic C5-C7 (Benzene)	Toxic	0 out of 3	-	0.0493	ATRISK
Aromatic C7-C8 (Toluene)	Toxic	0 out of 3	-	85.9	ATRISK
Aromatic C8-C10	Toxic	0 out of 3	-	14.8	ATRISK
Aromatic C10-C12	Toxic	0 out of 3	-	57.3	ATRISK
Aromatic C12-C16	Toxic	0 out of 3	-	142	ATRISK
Aromatic C16-C21	Toxic	0 out of 3	-	272	ATRISK
Aromatic C21-C35	Toxic	0 out of 3	-	898	ATRISK
Naphthalene	Toxic	0 out of 3	-	0.585	ATRISK
Acenaphthylene	Toxic	0 out of 3	-	588	ATRISK
Acenaphthene	Toxic	0 out of 3	-	588	ATRISK
Anthracene	Toxic	0 out of 3	-	6270	ATRISK
Fluorene	Toxic	0 out of 3	-	615	ATRISK
Fluoranthene	Toxic	0 out of 3	-	822	ATRISK
Phenanthrene	Toxic	0 out of 3	-	8270	ATRISK
Pyrene	Toxic	0 out of 3	-	563	ATRISK
Benz(a)anthracene	Toxic	0 out of 3	-	4.57	ATRISK