Our Ref: 44319877/SAB
Your Ref:

01 August 2006

Environment Agency
Ghyll Mount
Gillan Way
Penrith 40 Business Park
Penrith
Cumbria
CA11 9BP

For the attention of Mr P Bardsley

Dear Peter

Re: Rhodia Whitehaven, Plots A and B site investigations, and Deep Groundwater Monitoring Report

Thank you for your comments on the proposed scopes of works for Plots A and B site investigations. We have included answers to your queries and further information below, for clarity with your questions included (italic type).

1.0 PLOT A ENVIRONMENTAL SITE INVESTIGATION & ASSESSMENT PROPOSAL

The previous phase II investigations of June 2005 suggest a revision of the significant pollutant linkages based on the findings of a quantitative risk assessment. This modification cannot be accepted by the Agency, as such a revision of the SPLs forming an aspect of the determination process is a function of the Copeland Borough Council under part IIA.

This point is noted.

3.5.2 Analysis for leachate samples should also include testing for organics as well as metals. Organics (SVOCs, TPH) are included in the testing suite for leachate.

Organics are included in the leachate testing. The full suite is listed in the table in section 3.5.4.

3.5.3 The 5 existing shallow boreholes within plot B should be decommissioned if their integrity is in doubt. The damaged boreholes should be grouted up to prevent vertical migration from soils into groundwater. This activity should not cause detriment to the quality of results from the new monitoring boreholes.

The integrity of the five wells will be assessed during the investigation. Should there be any damage, URS will recommend either repair or decommissioning these wells as appropriate to Rhodia.

3.5.4 PAHs need to be included in the suite as napthalene was one of the CoC.

PAHs are included as part of the SVOC analysis suite. Napthalene is also included within the VOC suite. For your additional information we enclose a print out of the full list of substances included in the SVOC, VOC and PAH suites.

The analytical suite should include chloride, electrical conductivity, major ions and REDOX potential for the shallow groundwater for consistency with the deep groundwater monitoring suite.

Electrical conductivity, pH, redox potential, dissolved oxygen and temperature will be measured in the field at the time of sample collection (this is included in our standard groundwater sampling method). Omission of chloride is an error and this will be included in the suite. We do not propose a full major ions suite at this stage because this investigation aims to identify contamination. If a longer term monitoring programme for shallow groundwater is proposed as a conclusion of this work, consistency with the deep groundwater monitoring programme will be reviewed.

There is no justification for the parameters chosen for soil, groundwater or leachate analysis. Until a justification for the analytes to be tested is produced, I cannot comment on the acceptability of the schedule.

Justification for the analytical schedule is provided in the Remediation Statement for the site entitled *Remediation Statement, Former Albright and Wilson Works, Whitehaven* (REF: 44319877, dated 23rd June 2006) in the following sections:

- Section 3.1 *Assessment Actions* (Pages 7-8)
- Section 4.1 *Pollutant Sources* (Pages 14-17)
- Section 4.4 Significant Pollutant Linkages (Pages 19-23)

2.0 PLOT B ENVIRONMENTAL SITE INVESTIGATION & ASSESSMENT PROPOSAL

The previous phase II investigations of June 2005suggest a revision of the significant pollutant linkages based on the findings of a quantitative risk assessment. This modification cannot be accepted by the Agency , as such a revision of the SPLs forming an aspect of the determination process is a function of the Copeland Borough Council under part IIA.

This point is noted.

1.3 Confirmation of the additional data required for characterisation of the impact (potential or otherwise) as derived from the PPC phase 1B2 ERM report is required as this will be needed to agree the analytical suite.

Table 4.2a in the ERM PPC site condition report lists the substances used which were specifically hazardous to the environment. The site investigation has taken these into account. The substances listed for the Imidazoline/CAPB Plant are:

Caustic soda, hydrochloric acid– indicated by pH test and electrical conductivity (and chloride for HCl)

Ethoxylated alcohol – highly soluble and biodegradable and very unlikely to be still present in either soil or groundwater, even if spilled. Not readily analysed for; would contribute to COD and BOD

however these don't provide any information on the source, and given likely presence of TPH in large amounts not distinguishable.

Kathon CG (isothialozone) is a broad spectrum biocide used in very small amounts in washing powders. There is currently no standard test available in commercial labs for kathons in soil or groundwater as far as we can ascertain. It is highly biodegradable and non-persistent. We do not consider that the risk associated with the possible presence of this substance resulting from spillage is sufficient to justify the cost of the test development.

Monochloroacetic acid: highly soluble and biodegradable and unlikely to still be present even if spilled formerly. pH and chloride are indicators although they do not provide specificity.

Tertiary amines: are indicated with total organic nitrogen, ammonium and nitrate which are potential breakdown products. Many amines are odorous at low concentrations and any significant contamination may be detectable by smell.

The historical coke activities are likely to have caused contamination with polluting substances including sulphur, tar and benzol and this needs to be addressed. PAH and SVOCs found in previous investigations are evidence of this.

Tar and benzol are complex substances normally addressed with reference to indicator compounds such as PAH, benzene and substituted benzenes, all of which are included in the VOC and SVOC suites.

Sulphur, Acid Soluble Sulphide, and Sulphate were tested for in the Phase II Investigation entitled *Additional Investigation at the Former Albright and Wilson Works*, Whitehaven (REF: R1550-B01/4557-033-787/ARC/JMC, dated 14th July 2003). In trial pits TP1-TP17 the following results were determined from the ICRCL Maxi Gasworks Suite requested from the Laboratory:

Trial Pits TP1-TP17

Analyte	**Minimum**	**Maximum**	**Mean**
Total Sulphur (%)	<0.01	3.38	0.50
Acid Soluble Sulphide (mg/kg)	<5	61	<5
Total Sulphate (mg/kg)	490	156600	21576

The above results provided evidence to suggest that soil concentrations of sulphur and sulphide were not significantly elevated, and hence they were not included in the recent proposals. However, we shall schedule a number of samples for sulphur and sulphide for the purposes of clarification.

3.4 The 10m spacing between TP1-TP17 conforms to para. 7.6.2.5 of BS10175 regarding sampling density at a gas works site, whereas a 20-25m centre spacing is recommended for main investigations. If the coke works site extends beyond the area of concentrated investigations TP1-17, the investigation will need to be supplemented with more locations for ground investigation for targeting 10m centres in the process areas of the former coke works.
There are some gaps on the proposed sampling plan that do not meet the 25m centre spacing requirement and this should be rectified to allow adequate coverage.

The investigation comprising TP1 –17 was undertaken during April 2003 and it is not planned to undertake further investigation in this part of Plot B.

The current proposed spacing is based on BS10175 including URS professional judgement, which is fully in compliance with the standard. If during the site investigation or after it, we are of the view that a robust remedial plan cannot be developed without further investigation we will advise Rhodia to this effect. It must also be understood that the trial pits in this investigation are much larger than normal because of the need to break very thick concrete – we are using a large excavator which makes very big holes. Consequently 10m centres will not be practical – the excavations would run into one another.

The gaps in the 25m grid in the current Plot B investigation are predominantly located within the southern part of the area where historical evidence and existing boreholes has indicated that there is not the requirement for the same coverage. We note that the trial pit spacings in BS10175 are for guidance – they are not a prescriptive requirement and all of our proposals are based on the guidance including our professional judgement; this is in accordance with the standard. Our judgement in this area includes the fact that these areas have not contained production plant and are separated from the remainder of the Plot B area by a low wall and embankment. The Site investigation locations scheduled for this area are centred around TP524 in order to further assess some of the observations made there.

Within the Northern part of Plot B, on the site of the Imidazoline plant, the locations are aimed to be spaced at an average a 25m grid. However it should be noted that this will not be exact due the presence of underground structures and services which may determine the precise location of some of the investigation locations.

A contingency for extra ground investigation and analysis is recommended to ensure flexibility during the investigation as it may be necessary to do further work as unexpected contaminants a re identified.

While every effort has been made to address the known issues and those which may arise, URS will automatically undertake a limited revision of the works as required in order to address issues relating to unexpected ground conditions and observations on ground quality as they arise (in discussion with Rhodia). The analytical suite is broad and should identify unexpected VOCs, SVOCs, and metals, though this is primarily geared towards a controlled waters receptor. Any need for additional investigation will be communicated to Rhodia.

3.5.2 Analysis for leachate samples should also include testing for organics as well as metals as these are likely to be present given the former industrial use.

Organics are included in the testing suite for leachate. The full suite is listed in the table in section 3.5.4

3.5.3 The 2 existing shallow boreholes within plot B should be decommissioned if their integrity is in doubt. The damaged boreholes should be grouted up to prevent vertical migration from soils into groundwater. This activity should not cause detriment to the quality of results from the new monitoring boreholes..

The integrity of the two wells will be assessed during the investigation. Should there be any damage, URS will recommend either repair or decommissioning these wells (as appropriate) to Rhodia.

3.5.4 The analytical suite should include chloride, electrical conductivity, major ions and REDOX potential for the shallow groundwater for consistency with the deep groundwater monitoring suite.

Electrical conductivity, pH, redox potential, dissolved oxygen and temperature will be measured in the field at the time of sample collection (this is included in our standard groundwater sampling method). Omission of chloride is an error and this will be included in the suite. We do not propose a full major ions suite at this stage because this investigation aims to identify contamination. If a longer term monitoring programme for shallow groundwater is proposed as a conclusion of this work, consistency with the deep groundwater monitoring programme will be reviewed.

There is no justification for the parameters chosen for soil, groundwater or leachate analysis.

I would expect a more comprehensive suite of determinants within the TP1-17 area as this has proven contamination of PAHs. The 10 proposed for soil is insufficient, as there is not enough for each sample from this hotspot area. The vertical profile in this area is also required in perhaps some, but not all 17 proposed within this area which would result in the need for more than 17 in this area, plus the requirements of the rest of the plot. This criteria for soil and leachate sampling applies to all the organic tests , sulphate, cyanide and thiocyanate in the hotspot area.(Tp1-17).

The investigation in the TP1-TP17 area was undertaken in April 2003. This contained a metals suite, water soluble boron, CRVI total and free cyanide, thiocyanate, total sulphur, pH, PAHs and Phenols in each borehole. An additional six samples were scheduled for determination of TPH, VOCs, SVOCs and NRA leachate preparation. It is not proposed to undertake additional analysis in this area.

For the proposed investigation, PAHs are also included in the SVOC suite, and therefore the total number of soil analyses for PAH will be 30, not 10. It is our view that this is sufficient.

In order to cut down costs for this exercise, a pragmatic solution could be devised whereby the leachate suite is adopted to reflect the findings of the soil test. If no CoC is found in the soil analysis, it will not be required in the leachate analysis. If this is not practical, analysis for CoCs in soils should equally apply for the leachate tests.

The primary aim of this investigation is to assess the potential to impact a controlled waters receptor. It is our experience and view that the use of total analyses to assess the potential for water pollution by metals is not particularly useful, since there is no sensible “total” guideline level for metal content in

soils to protect groundwater. This is also true for the soluble organics and anions, where the leach test is a much better guide to pollution potential than the total. We normally schedule a selection of samples for both total and leachability testing to evaluate the relationship between the two, however there is often no correlation and the benefits of a faster turnaround are considered in this instance to outweigh the benefits of phasing the testing. We already have a great deal of data on this site. The investigation we have designed considers the relative analytical costs and benefits and is in our view the most cost effective means to obtain the data required for the risk assessment.

Until a justification for the analytes to be tested is produced, I cannot comment on the acceptability of the schedule.

Justification for the analytical schedule is provided in the Remediation Statement for the site entitled *Remediation Statement, Former Albright and Wilson Works, Whitehaven* (REF: 44319877, dated 23rd June 2006) in the following sections:

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- Section 4.4 *Significant Pollutant Linkages (Pages 19-23)*

3.0 GROUNDWATER MONITORING REPORT REF. R2216-B02

The geochemical analysis undertaken on a quarterly basis should be expanded for consistency with the contaminants of concern identified with significant pollutant linkages under Part IIA. The June 2005 report highlighted that some of these CoCs were unlikely to be present in groundwater receptors, as defined by the quantitative risk assessment. Therefore it may be considered prudent to analyse the waters in a single round of sampling as a quality control measure to verify the June assessment. The additional substances to be added to the existing analytical would include As, Cd, Cr, Bo, Pb, Hg, Ni, Se Zn were identified in the determination notice. COD and ToC would also be useful indicators for assessment of groundwater quality.

The Environment Agency has previously been satisfied with the deep groundwater monitoring suite. It was designed to monitor contaminants that have actually been detected in significant amounts on the site. So far no evidence for a risk to controlled waters from the above substances has been found.

2.1 Figure 1 is missing from the report.

Figure 1 enclosed

2.2 The agency have not been provided with the deep groundwater monitoring report URS(Ref:44319646/R1771-B02, dated 21 Jan2005).

All the data contained in that report is presented in the current one, which additionally contains interpretation.

3.2 The Bytead spring still appears to be a major sink for drainage and groundwater from the site and is affected by hydrological and hydrogeological factors. Continued monitoring and assessment of the declining trend is envisaged when operations completely cease. The remaining pulses and fluctuations will benefit from an MNA programme as recommended.

Point noted

3.3 It is interesting that BH203, which was considered as upgradient of the site, has been affected by site processes and is now not thought to be well protected by the shallow superficial deposits. Apart from confirming that the geology is complex, it confirms the Whitehaven sandstone is being affected.

Point noted

3.4 Similarly in BH202, the hydrocarbon contamination suggests complex geology and rapid migration.

Point noted

The impact of residual contamination in the flooded mines on surface water receptors and the sea has not been determined , but as this falls outside the scope of EPA 1990 part IIA, continued monitoring and a dedicated assessment of the impact will need to be addressed under the Water Resources Act 1991. Such further work should look at a risk assessment that models the impact on the beach discharge and Bellhouse Gill.

This issue was considered in the Phase II report submitted to the Environment Agency for comment in 2005 (ref 44319623/R2037 Issue 2). A mass balance model was developed, predicting the releases of contaminants from the Byerstead Fault and into Bell House Gill.

Yours sincerely
URS Corporation Ltd

Sophie Bowtell
Principal Consultant

Enc
CC Tom Dutton, John Moorhouse Rhodia