1. TASK SUMMARY

This Appendix provides a report of the field works and laboratory chemical analysis undertaken to meet the objectives defined in Section 2 of the main report. The justification for the scope of works, sample locations and analytical suite are presented in the URS proposal 3033251 (dated 23rd June 2006), along with subsequent correspondence with the Environment Agency in Appendix A.

The soil and groundwater investigation undertaken as part of the additional measures required by the preliminary remediation statement[1] was undertaken as a series of tasks as summarised below:

Task 1 Preliminary Works;

Task 2 Trial Pitting/Drilling and Soil Sampling;

Task 3 Shallow Groundwater Sampling and Levelling;

Task 4 Laboratory Analysis and Data Management

2. TASK 1 – PRELIMINARY WORKS

Prior to start of site works, a Health and Safety Plan was developed and then reviewed and authorised by Mark Smallbones (Health and Safety Representative for the Manchester Office), Matthew Logan (Project Manager), and Frank Wigley (Contract Manger). URS approved subcontractors were mobilised, including: Trial Pitting Operators (Joy Plant), Drilling Firm (Global Probing and Sampling), and Topographic Levelling Team (Survey Systems).

A site walkover was conducted on 18th July 2006 by: the Project Manager, the URS field engineer and representatives of Rhodia and Huntsman. A discussion was held to assess the scope of the site works. Central to this discussion was the identification of underground services in the area. Once this had been completed, each location was agreed and marked out. It was agreed that should a location require moving, the prior consent of Rhodia and/or Huntsman would be requested.

Mobilisation to site occurred on 24th July 2006. Following the discussions held during the site walkover, the Rhodia supervisor issued a permit, authorising intrusive works at each of the identified locations.

The Site Safety Officer (SSO) conducted a Health and Safety induction with the subcontract Trial Pitting Operator (Lawsons) and Drilling Operator (Global Probing Sampling), discussing safe methods for the intrusive works. The site works commenced at 10am on 24th July 2006 and were completed on 31st August 2006.

[1] Former Albright and Wilson Works, Whitehaven, Cumbria: Site Remediation Statement. Rhodia UK Ltd, URS. May 2006 (ref: 44319877/R2234.B01)

3. TASK 2 – SITE WORKS

3.1. Investigation Locations and Rationale

The locations of the trial pits and soil borings were allocated based on an simple grid spaced pattern to allow delineation of the previously identified potential contaminants of concern, however the precise location of the sampling points was influenced by operational considerations such as the presence of buried services, or due to professional judgement made given historical land use. Justification as to the sampling density is made in the proposal and subsequent correspondence with the Environment Agency included in Appendix A. The sampling locations are indicated on Figure 4.

3.2. Trial Pitting

Trial Pitting was undertaken between 1st August 2006 and 4th August 2006. Prior to excavation, each location was cleared with a Cable Avoidance Tool (CAT Scan). The presence of concrete hardstanding (frequently over 1 meter in thickness) covering much of the area of Plot B meant it was necessary to use a hydraulic breaker attached to a backhoe excavator to advance excavations. Following concrete breaking, 30 trial pits of approximate area 1m x 3.5m were advanced using a mechanical backhoe excavator to a maximum depth of 4m bgl.

Soil inspection and sampling were undertaken as described in Section 3.4.

The excavations were discontinued on contact with natural ground that was observed to be uncontaminated where bedrock prevented further excavation. At some locations concrete foundations were encountered at depth, with odourus black water which was considered to contain significant potential contamination lying above them. Where this situation was encountered the excavation was discontinued as it was considered that breaking through the concrete may potentially create a pathway for the contaminated water to the underlying aquifer. Trial pits were backfilled with arisings in the reverse order to their excavation, then informally compacted using the bucket and tracks of the excavator.

3.3. Drilling Works

Drilling works were conducted between 16th August 2006 and 18th August 2006. Prior to excavation, each location was cleared with a CAT Scan. Five boreholes (WS551B – WS555B) were advanced to up to 6m bgl using an *Archway Competitor Drill Rig* (Window(less) Sampler) technique. This technique drives a metal sampling tube 100mm in diameter and 1000mm in length containing a single use acetate liner into the ground using a hydraulically driven falling weight. A metal casing is driven into the ground along with the sampling tube, facilitating the extraction of the sample core after each successive metre, and preventing the collapse of the borehole sides and subsequent cross contamination of the soils yet to be sampled.

The process of inspection of the soil cores and collection of samples is described in full in Section 3.4.

Groundwater monitoring wells were installed in four of the five locations, using 50mm HDPE casing and screen, an inert gravel pack and bentonite seal. Top hat type covers were used to reduce the potential for the loss or damage to the borehole, given the likelihood of heavy plant machinery operating in the investigation area during future groundworks. One borehole (WS554B) was not installed with a monitoring well due to refusal on a concrete boulder at 0.8m bgl and was instead reinstated using bentonite.

3.4. Soil Inspection and Sampling

The URS field engineer logged the geological sequence observed as the excavation progressed. To assess the potential for contamination, headspace analysis was conducted on samples selected from horizons where there was visual or olfactory evidence of contamination, or where there were pertinent changes in the geology. Where these indicators were not present, samples collected from regular intervals for headspace analysis (typically every 0.5m). These samples were screened using a photoionisation detector (PID meter) fitted with a 10.6 keV bulb to assess the potential for chemical impact from volatile hydrocarbons.

Soil samples were collected at a variety of depths from both contaminated and uncontaminated horizons, from the Made Ground and from the natural ground to provide a robust, valid and comprehensive assessment. These were placed directly into containers supplied by the laboratory, and stored under chilled conditions prior to dispatch to the URS approved laboratory (Alcontrol Geochem).

4. TASK 3 – GROUNDWATER SAMPLING AND LEVELLING

4.1. Groundwater Sampling

Groundwater sampling was undertaken on 30th August 2006. Measurement of the depth to water (or free phase oil product below ground level) was conducted using an oil/water interface probe. Water was found to be present in two of the four monitoring wells (WS552B and WS553B).

The lack of water in wells on site, and recent dry weather caused concern about these two wells being purged dry and failing to recharge, preventing the collection of groundwater samples. To avoid this, grab samples were taken prior to purging using a dedicated bailer. After taking the grab samples, it was attempted to develop the monitoring wells and purge at least three times the well volume or until groundwater parameters stabilised however, both wells were dry before this occurred and did not recharge quickly enough for samples to be taken.

The grab samples, together with a field blank and a trip blank were placed directly into laboratory supplied containers and stored under chilled conditions prior to dispatch to the laboratory. It was not considered appropriate to collect a duplicate sample given the limited water available.

4.2. Levelling

A levelling survey of all locations relative to Ordnance Datum and the grid co-ordinates was conducted by a specialist sub-contractor (Survey Systems) between 30th August 2006 and 31st August 2006. For the monitoring wells, the depth to the top of the pipe and the cover level was measured to use in conjunction with the groundwater data to determine the groundwater flow direction.

5. TASK 4 - LABORATORY ANALYSIS AND DATA MANAGEMENT

As stated in Section 3.1.2 of the Remediation Statement[1], the final analytical schedule was determined by the ground conditions at the site during the investigation. Leachate samples were also scheduled from the soil samples in order to gain an understanding of the potential concentrations that may be leached from the soil (and subsequently enter the groundwater).

The analytical suite was determined by the contaminants of concern identified within the conceptual site model derived by Copeland Borough Council, and the further information obtained through URS's Phase II investigation as well as review of the historical processes undertaken at the site. The rationale for the final analytical suite is discussed in the main report. The samples submitted for analysis, together with the full analytical suite are given in Table 1.