APPENDIX I

SUPPORTING INFORMATION FOR ACID/SILICA-GEL CLEANUP

Cleanup procedures and analytical methods described in Washington State Department of Ecology's publication *Analytical Methods for Petroleum Hydrocarbons (*Ecology 1997) were used for the analysis of petroleum hydrocarbons in Uplands Area RI soil and groundwater samples. For the analysis of diesel-range, motor oil-range, and heavy oil-range petroleum hydrocarbons, an acid/silica-gel cleanup procedure was performed prior to analysis of the samples using Method NWTPH-Dx. As written in Ecology's publication, an acid/silica-gel cleanup technique may be employed in those cases where samples contain a significant amount of naturally occurring non-petroleum organic material (e.g., leaf litter, bark, etc.), which may contribute biogenic interferences. Because Parcel 3 is underlain with a layer of fill material (silts, sands, and gravel) that contains varying amounts of wood debris and also a relatively thick layer of wood debris (about 6 to 11.5 ft thick) below the fill material, biogenic interferences due to the wood debris were considered likely during the NWTPH-Dx analysis of soil samples. Also, because the groundwater saturation zone includes these layers of wood debris, biogenic interferences due to wood debris were considered likely during the NWTPH-Dx analysis of groundwater samples. An acid/silica-gel cleanup performed on the extracts prior to analysis was used to reduce or eliminate the non-petroleum organic material. According to Bob Carrell at Ecology's Manchester laboratory, the use of acid/silica-gel cleanup on soil and groundwater samples is appropriate due to the presence of buried wood waste in the subsurface at Parcel 3 (Ecology 2004).

According to the method, the acid/silica-gel cleanup step could result in a loss of between 10 and 20 percent of some petroleum products (i.e., heavy fuel oils). As required by the method, to account for this loss standards that had undergone an acid/silica-gel cleanup were used to calibrate the analytical instruments when analyzing soil and groundwater samples by Method NWTPH-Dx. The use of these standards is documented in the case narrative of each applicable laboratory report.

To further evaluate whether or not the acid/silica-gel cleanup resulted in loss of some petroleum hydrocarbons, selected chromatograms for the semivolatile organic compound (SVOC) analyses were evaluated. An acid/silica-gel cleanup is not performed for the SVOC analysis. If total petroleum hydrocarbons (TPH) were present in the sample, a response would be observed on the SVOC chromatogram. The chromatogram for the SVOC analysis of the groundwater sample collected at MW-110 during the second monitoring event was selected for review because product had been observed in this well during the previous groundwater monitoring event. TPH was not detected in the groundwater at this well during the second groundwater monitoring event. If a TPH response on the SVOC

chromatogram was present but not present on the TPH chromatogram, it would be possible to assume potential loss of TPH due to the acid/silica-gel cleanup. However, as shown on Figure J-1, no TPH response is present on the SVOC chromatogram for sample MW-110, which supports the conclusion made from the TPH chromatogram for sample MW-110, and that there is no detectable TPH present in groundwater at monitoring well MW-110. According to the laboratory, the peak present on the SVOC chromatogram for sample MW-110 is likely sulfur. For comparison, a chromatogram for an SVOC analysis performed on a non-project sample, which had a diesel-range organic concentration of 1.4 mg/L, is shown on Figure J-2.

REFERENCES

Ecology. 2004. Personal communication (Telephone conversation with Bob Carrell, Washington State Department of Ecology, Manchester Lab, re: *Acid/Silica Gel Cleanup on Groundwater Samples*). Stacy Pischer, Landau Associates, Inc., Edmonds, Washington. August 31.

Ecology. 1997. *Analytical Methods for Petroleum Hydrocarbons*. Washington State Department of Ecology. Publication No. ECY 97-602. June.

Data File: /chem1/nt6.i/20040911.b/ha44e.d
Date : 11-SEP-2004 18:26
Client ID: MW-110
Sample Info: HA44E
Volume Injected (uL): 1.0
Column phase: RTX-5

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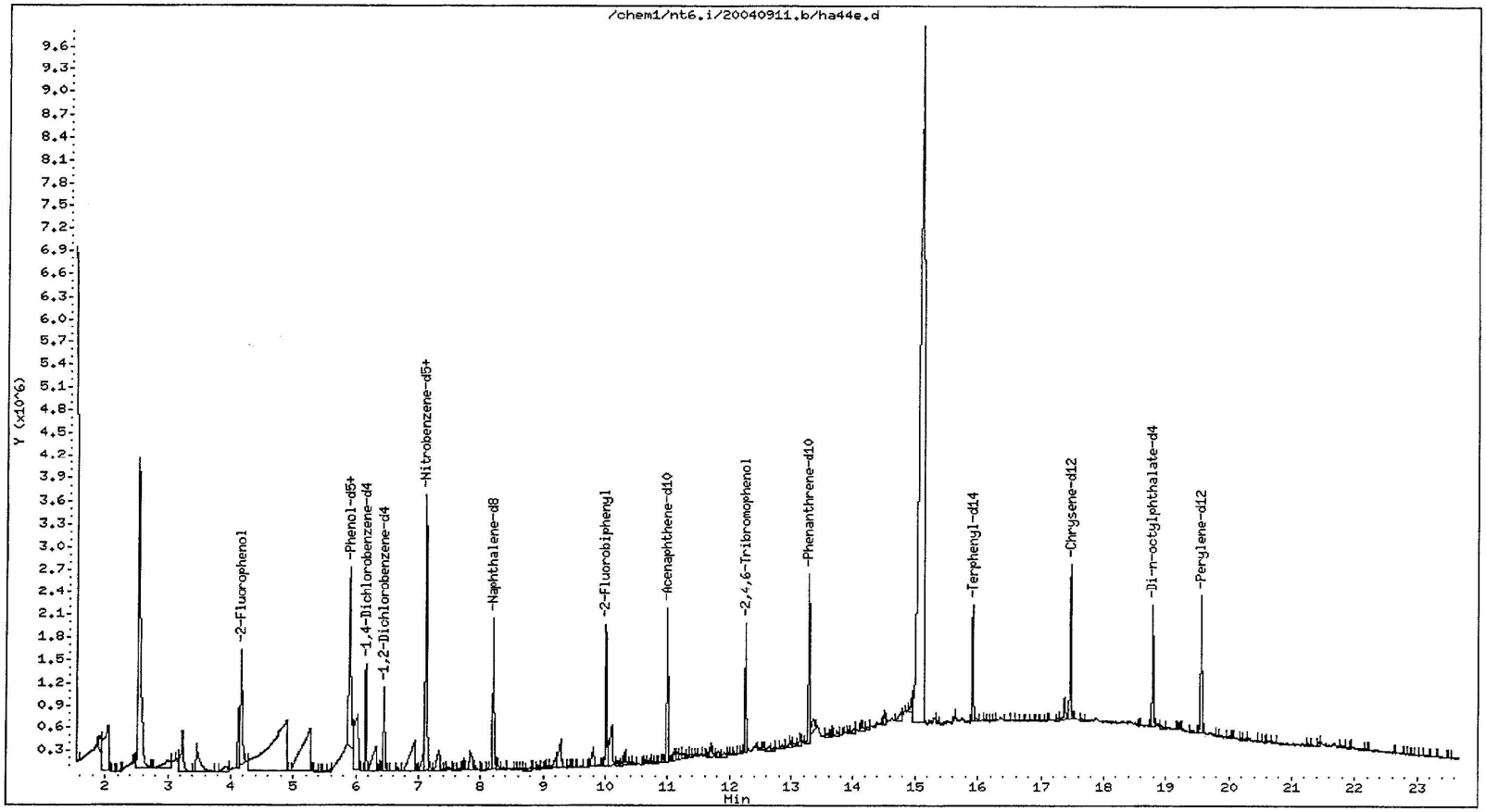
Instrument: nt6.i

Operator: VS
Column diameter: 0.32



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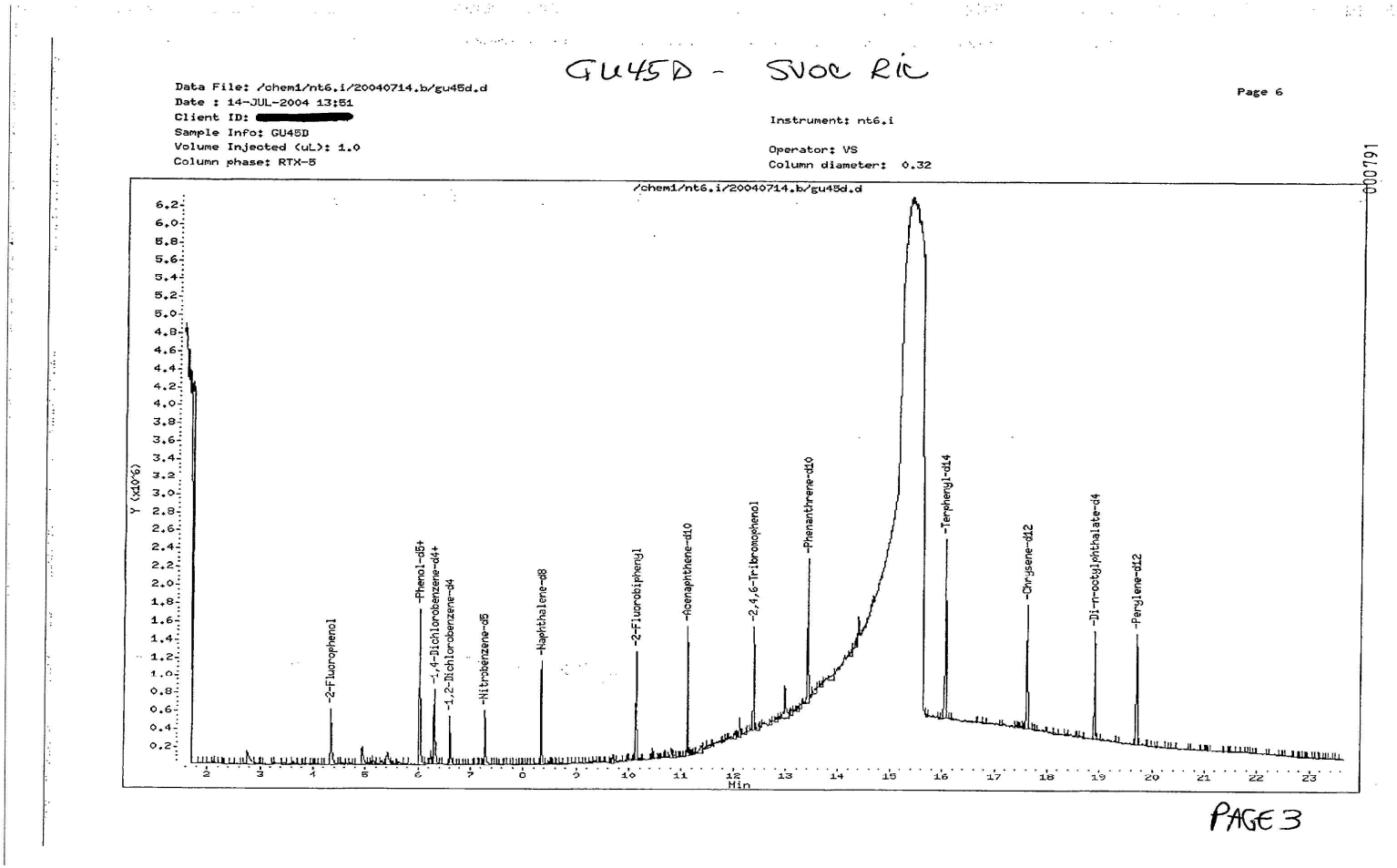
Port of Anacortes
Anacortes, Washington

SVOC Chromatogram – MW-110

Figure
I-1



LANDAU ASSOCIATES	Port of Anacortes Anacortes, Washington	**SVOC Chromatogram – Non-Project Sample with Diesel-Range Organics Present**	Figure I-2