

Our reference: 825.cc

Wednesday 2 March, 2005

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Dear Greg

**Response to Independent Peer Review, Public Environmental Review (PER) for  
Remediation of the Former Cresco Site Bayswater.**

Thank you for your comprehensive review of our proposed remediation works associated with the former Cresco site.

In consultation with Parsons Brinckerhoff, the following comments are offered on a 'without prejudice' basis and in response to issues you raised during your review. Obviously there were quite a number of deliberations between various parties during preparation of the PER to which CSIRO were not privy. The following may assist in understanding how these deliberations have influenced the material presented in the PER and where, for example, reference data relating to the site and remediation planning may be referenced.

**General Comments**

As you have observed, the remediation plan was prepared in light of the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* and its mirror legislation within Western Australia. It is probably worth noting that Parsons Brinckerhoff has also reported some significant errors within the Contaminated Sites Management Series 'Assessment Levels for Soil, Sediment and Water' (DoE, 2003) and expressed concern that these levels be given primacy over the original source information (for example, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*). Aware of these inconsistencies, the PER was prepared with reference to the primary source information and legislative requirements, as appropriate.

**Contaminant Pathways**

Extensive surface and groundwater data has been compiled and analysed during preparation of the PER. It was decided not to include this extensive body of data within the PER *per se*, but rather to focus on summarising this information and its implications upon remediation planning for the site.

It is recognised that regulatory authorities (such as DoE and the Health WA) will likely wish to scrutinise the original data, however it was felt that inclusion of this data within the PER would detract from its readability by the general public. In recognition of this, two additional reports are currently being finalised for both the surface (drain) and groundwater monitoring conducted to date which present chain of custodies, analytical results and their interpretation and inferred contaminant pathways. These reports are available upon request.

The actual percentage of groundwater captured by the BMD that emanates from beneath the site has been previously modelled using MODFLOW and reported within 'Numerical Modelling of Groundwater Recovery and Recycling' (Nield Consulting Pty Ltd, 2003). Parsons Brinckerhoff considers the model to be a reasonable reflection of groundwater and contaminant throughflow at the site (and hinterland). A further

degree of confidence in the model was gained when, upon commissioning, the yields from the groundwater interception system were found to closely match those predicted by the model.

Instantaneous flow and contaminant load data ('snapshots') have been collected at sites along the BMD upstream and downstream of the site. This information is presented within the report "Bayswater Main Drain Contaminant Flux Investigation" (PB, 2005) and provides a valuable insight into contaminant pathways, urban and upstream contaminant contributions and the seasonal groundwater accession to the regional drainage system.

In addition to analytical data, the report "Annual Groundwater Monitoring Review, June 2003 – June 2004, Former Cresco Site, Railway Parade, Bayswater" (PB, 2004) also includes borehole logs and stratigraphic profiles for the area.

Parsons Brinckerhoff in association with RSG Pty Ltd have developed a sophisticated 3D model of soil contamination for the purposes of developing a detailed soil remediation strategy for the site. This also has enabled 3D visualisation of the distribution of contaminants and their co-occurrence across the site.

### **Natural Attenuation**

Parsons Brinckerhoff is currently finalising an assessment of natural attenuation of groundwater contaminants across the site using the DoE's corresponding Contaminated Sites Series guideline as part of its report "Assessment of Ammonia Removal Technologies for the Former Cresco Site, Bayswater" PB, in prep). This is being undertaken in concert with the abovementioned analysis of instantaneous flow and load data for the BMD as part of a study of ammonia removal and the discharge of effluent (ex lime dosing) from the site. Parsons Brinckerhoff estimates the travel time for groundwater to the BMD to be 5-7 years.

### **Sampling and Interpretation of BMD Data**

Instantaneous flow and contaminant loads have been collected (flux surveys) within the regional drainage network over the last 12 months. Dilution and natural attenuation modelling has been based upon this data which is currently being collated and summarised within the summary drain flux report.

It was noted at an early stage of the investigations at the site that contaminant concentrations in the BMD were likely to peak during summer baseflow conditions and that upstream dilution and source of contamination could also be important factors. In addition, target water quality objectives for the BMD should be no more stringent than typical urban water quality. The flux surveys provide useful information regarding background contaminant levels in the area and water quality targets within the BMD.

CSBP has recently commissioned ecotoxicological studies in order to determine appropriate water quality objectives to protect the Swan River ecosystem. This will also include an investigation of possible synergistic toxicity effects associated with aluminium and fluoride upon the request of the DoE, and Dr Batley of CSIRO, the peer reviewer.

Sampling conducted in the Swan River in the immediate vicinity of the BMD outfall was undertaken which verified the Swan River Trust's earlier findings that metal concentrations in shellfish and sediments within the river at this location were acceptable.

An integrated monitoring plan (for air quality, groundwater, BMD and the river) is to be prepared and implemented in accordance commitments provided by CSBP within the PER.

### **Groundwater Chemistry and Dilution Factors**

Groundwater remediation at the site has, more recently, been based upon contaminant concentrations observed from discharge from the groundwater interception field. As the field comprises 33 individual bores the contaminant concentrations are therefore likely to more closely reflect 'average' groundwater conditions from this portion of the site. As such, these concentrations have been used in preference to those from bore H10 and the PER was subsequently modified to represent this. The lime dosing system was designed upon test pumping of the interception field and is currently operating within design specifications.

The summary groundwater report, as describe above, provides a detailed analysis of long term groundwater data for the site. In addition to fluoride, the report also includes analysis of the distribution of other contaminants which given further support to the inferred extent of the contaminant plume and use of fluoride as a (relatively) conservative tracer.

In light of CSIRO's comments, CSBP commissioned Parsons Brinkerhoff to review a range of dilution factors within Table 6.1 as suggested. The outcome was that the range of dilutions had a minimal impact of COCs downstream (my memory is that CSBP has subsequently provided this information to CSIRO through Parsons Brinkerhoff)

### **Use of Representative Data Sets**

The variability of groundwater quality and contaminant contours are described in greater detail within the summary groundwater report. This data was used as the basis for remediation planning contained within the PER.

### **Remediation Options**

Assessment of soil volumes that may require excavation and remediation have been modelled using specialised 3D mining industry software. Depending upon actual excavation strategy, excavation volumes have been modelled for the site to realise HILF.

MODFLOW modelling was undertaken for the site which has, to some extent, been verified using data derived from operation of the groundwater interception field. The yield from the interception field has provided an indication of the volume of impacted water that may need to be captured and treated. However, CSBP and Parsons Brinckerhoff concur with the CSIRO's comments regarding residual impacts on groundwater following soil remediation and ongoing treatment requirements. Accordingly, CSBP has engaged CSIRO to investigate a number of possible options involving permeable reactive barriers. Most recently this includes a report titled "Laboratory Assessment of a Possible Remediation Method for Acidic Groundwater at the Former Cresco Site, Bayswater, WA" (CSIRO, 2004).

A rigorous investigation of possible remediation technologies was undertaken during development of a preferred remediation strategy. However, as mentioned, a summary of this work is presented in the PER. The investigative work also included laboratory and pilot-scale tests to verify treatment efficiencies for soil and groundwater remediation options.

### **Criteria for Remediation Success**

Assessment of soil volumes that may require excavation and remediation have been modelled using specialised 3D mining industry software. Depending upon actual excavation strategy, excavation volumes have been modelled for the site to realise HILF.

Measurement of the remediation endpoint in the PER is to be conducted against data from bore H10. The representativeness of this bore in terms of groundwater at the site may be better gauged from the quality of water encountered during pumping of the groundwater interception field. This will be further investigated during development of the Environmental Management Plan and, in particaulr, the Site Remediation and Validation Plan for the site.

### **Other Minor Comments**

The amendments as suggested have been generally accommodated within the PER prior to its publication.

CSBP has commissioned ecotoxicological studies to determine permissible concentrations in the river for chemicals of concern. Laboratory testing has been completed this week and CSBP is expecting to have a report on this testing within 2 weeks. The testing also included Direct Toxicity Assessment (DTA) as a means to appraise possible synergistic effects of the mixture of chemicals evident in drain water near the site. In particular, synergistic effects between aluminium and fluoride are being considered.

Dr Graeme Batley and Dr Jenny Stauber (CSIRO) have both kindly peer reviewed the proposed test procedures for the above toxicity testing program.

Thank you for your frank and thorough review of the PER, which I know has added considerable value to the document. These comments are provided to address areas of your peer review where CSIRO commented interalia that more information EPA could be required – as discussed I now intend to provide a copy of your peer review and this letter to the EPA for inclusion in its Bulletin on this project.

It is possible that I may ask CSIRO to meet with CSBP/Parsons Brinkerhoff and EPA in the next couple of weeks to discuss the peer review.

If you have any further queries regarding the above, please do not hesitate to call me on 9411 8234.

Yours sincerely

Cameron Schuster

Manager, Environment & Manufacturing Support