7 CONCLUSIONS AND RECOMMENDATIONS

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1. The pilot test was carried out to *assess* the feasibility of the technology, i.e. SVE and AS, for decontamination of Hot Spot B area of the KTA North Apron. The test was supervised by a team of local and international experts. TDD, the Consultants, EPD, OCTF and their consultants exchanged views on this test during the study period. Insights into the subsurface conditions of KTA have been gained and the response of the SVE/AS system under different operating conditions has been investigated.

2. The particle distribution analyses show that the site is made up of sand and silty sand, with silt content (<75μm) ranging from 6-37% and clay content (<5μm) less than 10%. Coarse sand/gravel fractions make up 14-33% by weight. The results agree in magnitude with previous data obtained in the TDD/OCTF joint investigation. No horizontal confining layer was found and this, along with the AS/SVE test results indicate that spread of contaminants away from the decontamination area during the AS operation is unlikely.

3. *Using a standard computer model, the permeability of the vadose zone, a key factor influencing the success of the SVE/AS system, was calculated to be quite high (>10-100 darcy) in 3 locations and moderate (> 1 darcy) in one location (VT3).*

4. *The Radii of Influence (ROI) for SVE (based on vacuum measurements) was found to be greater or close to the design value (12m). This seems to be supported by oxygen measurements and Pore Volume Exchange calculation, showing that the design well spacing is appropriate.*

5. *On the other hand, data suggest that the ROI for AS was ≥ 5m at VT3 area and 4-5m at VT4 area, marginally lower than the design value (6m).*

6. The VOC concentrations in the extracted vapors indicate that much of the contaminant can be efficiently stripped off the subsurface via SVE

7. Using indirect measurements of CO_2 and O_2, microbial degradation was estimated to be significant. In some cases, it was estimated to be responsible for greater than 50% of the contaminant destruction.

8. In only one location (VT3), several potential problems were identified, including groundwater mounding, channelling and limited dissolved oxygen.

9. *The highly permeable soils in the area of VT4 appeared to impede dispersion of aerated groundwater away from the injection wells, and this may result in a smaller ROI.*

10. *The pilot test indicates that SVE/AS is a feasible and effective technology to clean up the less contaminated area (i.e. below a trigger level determined by clean up rate calculation within Hot Spot B) to the required standard within the operation time frame*

of 18 months. Furthermore, SVE/AS has minimal environmental impact in comparison with other methods of decontaminating the site. For more contaminated area, other more effective alternatives should be considered and recommended.

11. Aside from being a decontamination method, SVE has been demonstrated to be an effective method to vent off VOC and methane, so workers can be adequately protected during future excavation. The hazardous gases are also destroyed in a controlled manner rather than being allowed to escape to the atmosphere.

12. *SVE/AS, being an in situ method, poses the least possible disturbance to the structural integrity of the airport tunnel. It also avoids the workers' "trip-fall" hazard encountered in large-scale excavation.*

13. *SVE/AS has much less land requirement than the large-scale biopile treatment and it is more cost-effective than the large-scale biopile treatment.*

14. *A remedial strategy in view of the remediation objectives, the pilot test results and other site constraints has been formulated in accordance with Environmental Permit No. EP-006/1998, and will be presented in a separate paper.*