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Memorandum

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CC	Greg Wright (AECOM), Cody Sipkema (AECOM), Amber Zilinsky (AECOM), Dele Morakinyo (INAC), Matthew Irvine (PSPC)		
Subject	Proposed Modifications to Landfarm Decommissioning Requirements		
From	Cathy Corrigan		
Date	June 1, 2018	Project Number	60515379

Due to a ten-fold increase from the tendered design volumes in Type B PHC contaminated soil identified for treatment at the CAM-E Keith Bay site, including approximately 5,300 m^3 for excavation and treatment during the 2018 season, the contractor has requested that the landfarm decommissioning requirements be modified to allow for as long a period as possible for soil treatment. This memo provides an evaluation of the relevant issues and recommendations to address this request.

Background

The Remedial Action Plan (RAP), which was provided to the Nunavut Water Board as part of the Water Licence (WL) application process, specified that: “The on-site treatment area will be constructed on a geosynthetic liner with containment berms”; and “When the on-site treatment area is no longer in use, the treated soil will be contoured to match the surrounding areas and the geosynthetic liner and support equipment will be removed and disposed off-site.” These specific requirements have therefore formed part of the WL approval and conditions, and will require approval of the board for modifications.

The Land Use Permit (LUP) contains no particulars related to landfarm decommissioning requirements, however does note the need to remove any obstructions to natural drainage.

The landfarm design includes perimeter berms varying in height between 0.8 m to 1.3 m, depending on existing topography and the overall gently sloping (up to 4%) facility grade. The base includes a geomembrane sandwiched between two non-woven geotextiles (“liner system”), overlain by 0.3 m of sand. The landfarm was built to design by Kudlik Construction Ltd. (Kudlik); however, the large increase in soil quantities in 2017 necessitated the construction of a second cell. The second cell was built immediately to the west of the first cell, with the original cell berm being left in place in between the two cells. A layer of 0.4 m of gravel was placed over the liner system instead of 0.3 m of sand. Both cells are graded to drain towards the northwest.

Existing Decommissioning Requirements

As per the RAP clause noted above, the liner system is to be removed and the facility is to be graded to provide for positive drainage. The Specifications contain no details regarding decommissioning requirements, other than noting that decommissioning procedures are to be outlined within the Contractor's PHC Soil Treatment Plan.

Kudlik's PHC Soil Treatment Plan states: "Once the confirmation is obtained that all PHC soil has been remediated from one cell, the treated soil will be removed from the facility and the liner and the geotextile will be removed and containerized….The treated soil and the granular material from the berms will be spread to a maximum thickness of 1.5 m. The entire area will be reshaped to promote positive drainage."

Technical Considerations

To allow for as long as possible to treat the large volume of soil necessitating treatment in 2018, Kudlik has requested that the liner system not require removal; the liner system would need to be removed in advance of any freezing temperatures to avoid it becoming frozen in place. Leaving it in place would allow for treatment to go on slightly longer into the fall. It would also allow the possibility of only having to treat soil to the depth guideline of 5000 mg/kg versus 2500 mg/kg, and then capping it in place with a minimum of 0.5 m fill thickness. Both of these opportunities greatly increase the potential of completing the site remediation in 2018 as planned, despite the considerable scope increases.

Two technical issues require consideration to potentially allow the liner system to be left in place: 1) the consideration of it as "waste material" and the risk of it becoming exposed in the future; and 2) the need to have unrestricted drainage.

1) The liner system as "waste material": At this site, we have constructed a permanent Tier II Soil Disposal Facility which contains a liner system. Liner systems have been used at all locations in Nunavut where Tier II Soil Disposal Facilities have been built. Liner systems are also commonly used for closure of mine tailings disposal facilities in the territories. In short, leaving such material in the ground is common practice. It is recognized that the Tier II Soil Disposal Facilities have typically large thicknesses of cover overlying the liner system in order to aggregate permafrost into the landfill contents; however, at every Abandoned Military Site, there are also typically multiple areas of buried debris (dumps or landfills) from existing operations. Unless there has been evidence of contaminant migration from them or they are geotechnically unable to be stabilized, they are left in place and capped with usually 0.75 m of surface fill, are contoured to promote positive drainage, and have side slopes graded at 4H:1V or 6H:1V to minimize slope erosion. Post-construction monitoring has rarely identified waste re-exposure due to erosion of the full surface cap on these remaining existing landfills. The same thickness of cap and grading can be applied overtop of the remaining liner system, with a very low risk of future exposure. The existing soil within the landfarm at closure could form the first cap layer. All soil would be placed in compacted lifts as per other earthwork specifications.
2) Drainage: The liner system will impede downward migration of water within the active layer; however, the landfarm cell bases with overlying liner system have been graded to drain towards one corner (the northwest). To guard against future ponding of water, the berms

around these low corners would be breached. Furthermore, the compacted lifts of fill placed overtop will provide some limitation to surface water infiltration, similar to at existing buried debris areas that are capped and the newly constructed on-site non-hazardous waste landfill. The final grading will also be designed to promote positive drainage.

Summary

It is our opinion that allowing Kudlik to leave the liner system in place at the landfarm would be desirable to the project to maximize their ability to treat all Type B PHC soil in 2018 and complete the project on schedule.

From a technical perspective, we propose that having a compacted surface cap of a minimum thickness of 0.75 m of fill, with side slopes of 6H:1V and the overall area graded and contoured to promote positive drainage will provide sufficient cover to guard against future liner system exposure. This procedure is also consistent with the remedial requirements of the Abandoned Military Site Remediation Protocol for low-potential environmental risk buried debris areas. To mitigate active layer water accumulation overtop of the liner, the berms at the low corners within the two cells should be breached prior to overall capping and grading.

I can be contacted at (780) 660-9543 should you require additional information.

Sincerely,
AECOM Canada Ltd.

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