



**BUILDING A BETTER WORLD**

August 3, 2011

**Chinook Energy Inc.**  
Suite 700, 700-2nd Street SW  
Calgary, AB  
T2P 2W1

**MWH File 6930698**

**Attention: Darren Tomecek**

Dear Darren:

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**Re: Environmental Site Assessment Reports  
Tree River C-36, Ontaratue River D-39 and Thunder River N-73**

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MWH was commissioned by Chinook Energy Inc. (Chinook) to perform an Environmental Site Assessment (ESA) at the following three sites

- Tree River C-36 wellsite (UWI: 300C366720131450) located at 67°15'09.0" N, 131°51'39.4" W (hereafter referred to as the "site").
- Ontaratue River D-39 wellsite (UWI: 300/D39671013130/00) located at 67°08'12.201" N, 131°37'09.331" W.
- Thunder River N-73 remote sump for wellsite (UWI:300/N73673013115/00) located at 67°23'51.5"N, 131°28'88.4"W.

The ESAs were recommended due to the concerns that Indian and Northern Affairs Canada (INAC) land use inspector had with the settling of the sump areas. Phase I ESAs were completed in the spring of 2010 in which no areas of potential environmental concern (APEC) were identified.

The scope of work, details of the field assessment, and analytical results are contained in the attached Environmental Assessment Reports.

### ***C-36 and D-39 – Drilling Waste***

The ESA indicated that there is evidence of drilling waste in the sump area. The area around the sump does not show that it has been impacted by the drilling waste. This was determined by analysis of samples from the sump to determine salinity levels. In particular, elements such as calcium tend to be elevated in a sump due to the number of drilling waste products which contain calcium. Based on the Phase I ESA and the limited sampling completed, MWH is not recommending further sampling as there has been no evidence of impacts to the site due to the drilling waste components.

### ***C-36 Recommendations***

Concerns were identified on the site in regards to reclamation. The drainage on the site has changed resulting in erosion to the bank of the sump area. The sump area has settled and the

berms around the sump are still above the height of the site and are not well vegetated. If the drainage continues as it is currently, the south bank of the sump will likely continue to erode.

MWH recommends that the sump area be reclaimed. The following is a potential reclamation plan:

- Separate the two sump cells using soil from the centre berm;
- Dewater the first cell;
- Use crushed cement from D-07 site as the first layer of fill in the sump.
- Use berm material to continue to fill the cell and contour. Contouring would be completed by a heliportable excavator and cat;
- Recontouring of the area surrounding the sump to help redirect drainage;
- Install erosion control measures required (e.g. gabion basket, erosion control blankets and sediment stop wattles) to prevent future erosion of the area;
- Dewater the second cell;
- The berms would be pushed into the cell and contoured;
- Use berm material to fill the second cell and contour;
- In order to divert some of the water currently flowing directly through the sump, install drainage channels around the sump area. Install weeping tile in these channels. Erosion matting would cover the buried tile. This would prevent the ponding of water and to allow continuous drainage;
- Seed the disturbed area with a regulatory approved mix.

The reclamation may still result in a depression in the vicinity of the sump. However, the drainage will be better controlled, preventing further erosion and possible leaching of salinity from the drilling waste.

### ***D-39 Recommendations***

No concerns were identified in regards to the reclamation of the site. There has been some settling in the sump areas but overall the drainage pattern of the site has not changed significantly compared to pre-disturbance conditions. Drainage is not causing erosion on the site. The ponding water within the two sump cells and around well centre are similar to what would be seen off site in a low area. The vegetation throughout the site is well established and there is established vegetation within the low wet areas.

MWH recommends that no further work be completed on D-39. The work required to fix the settling of the sump would likely cause more damage and affect the current regrowth of the site.

### ***N-73 Drilling Waste***

Soil samples were not taken on N-73 due to the physical restrictions of hand sampling in gravel and brush. However the possibility of movement of the drilling waste material is quite limited as

the area is dry, the surrounding vegetation to the sump is well established, and there are no signs of stress.

### ***N-73 Recommendations***

The sump has settled significantly, with the bottom of the sump area currently between 1 to 2 metres (m) below ground level. There is also a large amount of slash inside the settled area. Vegetation is not well established over the settled area.

MWH recommends that the sump area be reclaimed. The following is a potential reclamation plan:

- Determine if slash can be buried;
- Remove slash from the bottom of the sump area if needed;
- Using a heli-portable excavator and cat, recontour the sump area using cement from the D-07 site and the material to the east and north of the sump. This material contains a large amount of gravel and is compacted. It will require breaking up in order to be used as fill material;
- Ensure drainage follows original patterns and will not result in ponding in the sump area;
- Install erosion control measures (erosion control blankets) to ensure disturbed areas are well stabilized.
- Chip the slash into large woody debris and spread across the site.
- Seed site with a regulatory approved mix.

Due to the depth of the sump, the recontouring may not bring the settled area back to its original elevation. It will however assist in ensuring that drainage of the site follows pre-disturbance patterns and relieve the compaction of the soils on site so that vegetation can re-establish.

Recommendations for both C-36 and N-73 include the use of the cement in the sump. This cement is currently located at Moose Lake D-07, a site in the Sahtu Region. The cement has been characterized through on site inspection, laboratory analysis and confirmation with Schlumberger. The bags of cement are still on pallets and due to their exposure to rain and snow they are no longer in powder form but instead solid blocks of cement.

This is an unused product that would end up unnecessarily taking up space in a landfill. Because of this MWH is suggesting that this cement be re-used by adding it as fill. The cement itself is an inert product, the constituents do not mobilize unless under strongly acidic and wet conditions. The water in the sump at C-36 was tested in 2010. All samples showed a pH of between 7 and 8 which is neutral to slightly basic.

The recommendation is that a layer of this cement be added to the sump before the soil is recontoured. This would ensure that there is sufficient soil on top of the cement so as not to impact the rooting zone of the vegetation.

The reclamation plan will be dependent on the availability of heli-portable equipment and a method of transportation of this equipment into the region. Support and approval from the Gwich'in communities and from both INAC and the Gwich'in Land and Water Board (GLWB) is instrumental in the success of this program.

If you have any questions or concerns with the enclosed reports, please contact myself at (403) 543-5353.

Sincerely,  
**MWH**

A handwritten signature in black ink, appearing to read "M. Brightwell", written over a light blue grid background.

Monica Brightwell  
Senior Reclamation Project Manager