

## **LANDSPRAYING WHILE DRILLING (LWD) APPLICATION AND APPROVAL GUIDELINES**

### **Pre-spread Approval Requirements and Guidelines:**

1. Mud system must be a typical fresh water gel or polymer, gypsum water or nitrate gypsum water system.
2. Application to landspray must be made to the district office of the Petroleum Branch and must include:
  - ◆ written landowner permission, including a liability statement for damages. Occupant permission alone is insufficient;
  - ◆ a map showing the proposed spread area, which clearly indicates access and topography (drainage ditches, etc);
  - ◆ a description of spraying equipment, techniques and anticipated load rates;
  - ◆ waste storage plans in the event fluid cannot be spread within 48 hours of rig release . The Branch is to be advised if storage plans are implemented.
3. The spray area must be on land with slopes <1:5 and at least 100m from water bodies and drainage courses. Use of cultivated land is preferred but application on grasslands will be considered. Potentially sensitive sites will require Petroleum Branch site inspection. Special conditions may apply and will be noted on the Branch Approval form.
4. Pre-spread soil sampling, including control sites, must be performed on the receiving soil. Samples must be analyzed for EC, SAR, pH, Na<sup>+</sup>, Ca<sup>++</sup>, Mg<sup>++</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>-</sup>, NO<sub>3</sub> and K<sup>+</sup>. The receiving soil EC must be ≤ 2 dS/m and the SAR values ≤ 6.
5. The Petroleum Branch district office must be notified prior to spreading commencement. (Notification of spud by the drilling contractor or well owner serves as sufficient notice.)
6. Fluids must be monitored throughout the spreading process for pH, EC, TDS, Na<sup>+</sup>, Ca<sup>++</sup>, Mg<sup>++</sup>, Cl<sup>-</sup>, SO<sub>4</sub> to prevent significant modification of the existing soil parameters. Introduction of amendment chemicals, other than those necessary for pH adjustment, require prior branch approval.
7. The spread rate shall not exceed 20m<sup>3</sup> / ha when the ground is frozen (winter conditions) and 40m<sup>3</sup> / ha when it is not (summer conditions). The spread rate on grasslands shall not exceed 20m<sup>3</sup> / ha under any conditions.

### **Post-spread Approvals and Guidelines:**

8. Lifetime loading rates by all disposal methods (LWD, M-B-C, landspreading) are not to be exceeded. (See reference table.)
9. Post-spread sampling analysis includes the same criteria as item 4. If the hydrocarbon content in the drilling waste is >.5%, hydrocarbon analysis will also be required (oil as a percentage of dry weight).
10. Actual spreading and loading rates, all soil and fluid analyses, the quantity and type of any chemicals used to treat fluids and a detailed sketch of the spread area, including access route and permanent bench marks, must be submitted within 30 days of spreading unless otherwise approved by an inspector.
11. Spreading of drilling waste on any area under active rehabilitation is prohibited. Active rehab / absence of rehab will be noted on the Branch approval.

**Drill Cuttings:**

12. Prior to spreading, drill cuttings must be tested for EC, SAR, pH, Na<sup>+</sup>, Ca<sup>++</sup>, Mg<sup>++</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>-</sup>, NO<sub>3</sub>, K<sup>+</sup>, Specific Gravity and oil content as a percentage of dry weight, and can be mixed, buried and covered or disposed of in any other manner approved by a Petroleum Inspector. Chlorides must test <2000 mg/kg and pH must be >5 and <10.
13. Hydrocarbon content of subsoil and waste mixture must be ≤ .1% on a dry weight basis. (Calculated using a subsoil density of 1700 kg/m<sup>3</sup>.)
14. Approval to dispose of drill cuttings / restore the lease must be obtained from the district Petroleum Branch office prior to disposal. The district office will notify the well operator upon approval.
15. Test results must be submitted within 30 days of rig release.

**General:**

16. Using reduced spread rates or diluting the fluid are acceptable methods of treatment should levels exceed the parameters stated in the Reference Table.
17. Single application LWD load rates and lifetime maximum rates, by any combination of disposal methods, must not be exceeded. Refer to the attached table.
18. Disposal of solid waste on grasslands is prohibited.
19. Separate submission for approval is required for each well.
20. If LWD results in negative impact upon the soil, the site may be entered into the rehab. program by the Petroleum Branch; annual rehabilitation submissions will be required from the well operator until the site is approved (Section 103 of the Drilling and Production Regulations).

If you have any questions or require clarification in regards to these guidelines please contact one of the inspectors. The district offices can be reached at:

<b>Waskada (Townships 1-6)</b>	Telephone:	204-673-2472
	Fax:	204-673-2767
	Lorne Barsness	cellular: 204-522-5243
	Heino Weisberg	cellular: 204-522-5357

<b>Virten (Townships north of 6)</b>	Telephone:	204-748-4260
	Fax:	204-748-2208
	Bruce Dunning, Senior Inspector	cellular: 204-851-0440
	Allan Gervin	cellular: 204-851-0441

**Reference Table**

***Landspraying While Drilling and Drill Cuttings Parameters::***

<b>Pre-approved Mud System</b>	Fresh water gel or polymer, gypsum H <sub>2</sub> O or nitrate gypsum H <sub>2</sub> O
<b>Receiving Soil:</b>	slope <1:5 >100m from water EC ≤2 dS/m SAR ≤6
<b>Maximum Application Rates:</b>	Cultivated lands: 35 m <sup>3</sup> /ha summer 20 m <sup>3</sup> /ha winter (frozen ground) Grasslands: 20 m <sup>3</sup> /ha all ground conditions
<b>Trace Element Maximums (single application)</b>	Boron (B) – 5 kg/ha Lead (Pb) – 100 kg/ha Cadmium (Cd) – 1.5 kg/ha Nickel (Ni) – 25 kg/ha Chromium (Cr) – 100 kg/ha Vanadium (V) – 100 kg/ha Copper (Cu) – 200 kg/ha Zinc (Zn) – 300 kg/ha
<b>Analyte Maximums (single application)</b>	Chlorides (Cl) – 400 kg/ha topsoil - 800 kg/ha subsoil Sodium (Na) – 150 kg/ha {250*} - 300 {500*} kg/ha subsoil Nitrogen (N) – 200 kg/ha Total Dissolved Solids (TDS) – 1800 kg/ha Hydrocarbon Content – Fluids 0%; Soils ≤.1% dry weight basis

***Lifetime Loading Rates for Receiving Soils, all methods of disposal:***

<b>Trace Element Maximums</b>	Boron (B) – 10 kg/ha Lead (Pb) – 200 kg/ha Cadmium (Cd) – 3 kg/ha Nickel (Ni) – 50 kg/ha Chromium (Cr) – 200 kg/ha Vanadium (V) – 200 kg/ha Copper (Cu) – 400 kg/ha Zinc (Zn) – 600 kg/ha
<b>Analyte Maximums</b>	Chlorides (Cl) – 1600 kg/ha Sodium (Na) – 450 kg/ha {700*}(must be incorporated >30cm) Nitrogen (N) – 400 kg/ha Total Dissolved Solids (TDS) – 1800 kg/ha Hydrocarbon Content – Fluids 0%; Soils ≤.1% dry weight basis

***\*IMPORTANT NOTE: The sodium loading maximums listed are LOWER than the allowable limit in Alberta and Saskatchewan (shown in parentheses{ }).***