CleanSpacer™ III Spacer Fluid
Environmentally-safe, biodegradable spacer helps optimize wellbore preparation

CleanSpacer™ III spacer fluid helps operators economically achieve regulated wellbore integrity requirements while contributing to environmental sustainability. CleanSpacer III spacer fluid serves as part of the fluid train intended to prepare the wellbore to receive cement, efficiently displacing mud as it water-wets the formation and casing surfaces, thus enabling the hydraulic bond of the cement sheath for a long-term annular barrier. It can be designed with an optimized rheology and density for an effective fluid train. It is compatible with several environmentally friendly surfactants and it can be used in both water-based and oil-based drilling fluid environments.

CleanSpacer III fluid is an ecofriendly fluid consisting of biopolymers, non-toxic minerals and water. Utilized in a closed-loop system for drilling operations, CleanSpacer III fluid can be recovered when returned to surface and disposed of via bioremediation where authorized under applicable regulatory requirements. The bioremediation is accomplished by distribution of this fluid across permitted agriculture fields where it undergoes biodegradation from soil microorganisms. Spreading the fluid and tilling it into soil is significantly less complex and costly than drilling, maintaining, and injecting into disposal wells.

The bioremediation fields are managed on a crop rotation basis, improving soil structure, water retention and nutrient levels while mitigating pathogens. The fields are maintained under regulatory oversight and monitored for a balance between the addition versus assimilation of the waste material.

Operators using CleanSpacer III fluid have benefitted from consistently successful zonal isolation as validated by good cement bond logs. The wellbore integrity provided by way of a secure annular seal further contributes to environmental sustainability by inhibiting the upward migration of formation fluids and gases, helping protect fresh-water aquifers. Operators have also benefitted from the operational efficiency delivered by this fluid, avoiding non-productive time.

**Benefits**

CleanSpacer III spacer fluid is a spacer fluid that addresses displacement and water-wetting requirements during primary cementing operations, remaining highly functional while addressing the lowest level of environmental impact.

- Can be designed for the specific rheological and density needs of each well.
- The density can be adjusted in the field without requiring re-blending at the bulk-loading facility if mud weights change during drilling.
- Compatible with several environmentally friendly surfactants.
- Can be used in both water-based and oil-based drilling fluid environments.
- Designed to meet requirements for authorized distribution across permitted agriculture field to undergo biodegradation from soil microorganisms.
  - Does not require disposal by any more specialized, permitted means, eliminating the challenge and cost of transport and disposal fees related to certified landfills or injection wells.
  - Permitted fields used for bioremediation of this spacer fluid have shown improved soil structure, water retention and nutrient levels.
- Has a zero hydration period, reducing the amount of storage and blending/mixing equipment required on location during primary cementing operations, helping avoid non-productive time.
- Contributes to consistently successful zonal isolation, helping deliver a secure annular seal and further contributing to environmental sustainability by inhibiting the upward migration of formation fluids and gases.
- An advanced modeling tool helps optimize the rheological profile of the CleanSpacer III fluid, reducing the time and resources normally required to develop optimized fluid designs.

### CleanSpacer™ III Spacer Fluid - Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP No.</td>
<td>719269</td>
</tr>
<tr>
<td>Color</td>
<td>Variable depending on weighting agent</td>
</tr>
<tr>
<td>Temperature Range (BHCT)</td>
<td>80°F – 260°F (27°C - 127°C)</td>
</tr>
<tr>
<td>Density Range</td>
<td>9.5 ppg – 16 ppg</td>
</tr>
<tr>
<td>pH</td>
<td>6.5-8.5</td>
</tr>
</tbody>
</table>
CleanSpacer™ III spacer fluid can be disposed of by way of bioremediation (biodegradation from soil microorganisms). This is accomplished by distribution of this fluid across permitted agricultural fields.

Crop fields licensed for use with biodegradable waste fluid have had CleanSpacer III spacer fluid tilled in during the resting-year rotation of the fields.

For more information on CleanSpacer™ III spacer fluid, please call your local Halliburton representative or email us at cementing@halliburton.com.