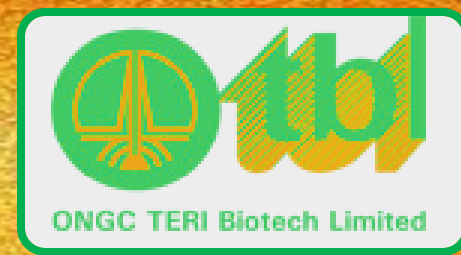


# Newsletter

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## Development of Eco-friendly Oil Well Drilling Fluid: XC Polymer (Xanthan Gum)

XC Polymer (Xanthan Gum) is used as an oil well drilling fluid as well as for polymer flooding of oil reservoirs for Improving Oil Recovery (IOR). Xanthan Gum solutions are highly pseudo-plastic. Industrial grade Xanthan Gum is used as an efficient environmental friendly oil drilling mud additive. Acting as a viscosifier and stabilizer, it has excellent tolerance to a wide range of temperatures, PH & salinity, and increase the mud penetration rate and suspension ability to the drill-cuttings. It can also reduce the pressure loss during drilling, stabilize the well-bore, prevent the damage to oil formation, and improve the efficiency of drilling, work-over and completion. In India, currently XC Polymer is mostly imported from China. However, the imported product has failed to meet the specific standard quality requirement of oil companies. TERI initiated research in the year 2015 on development of XC Polymer with a view to provide eco-friendly technology to oil industry to be used as drilling fluid/ viscosifier.

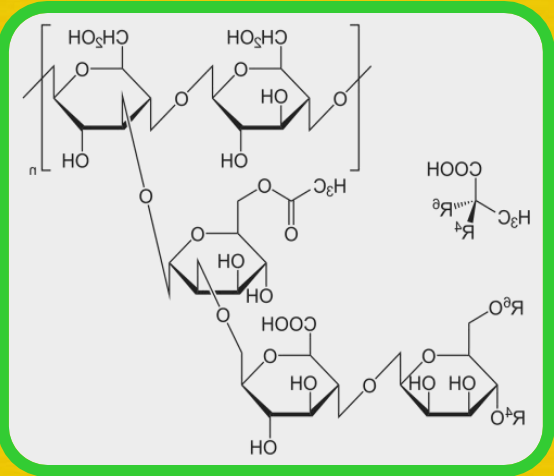
XC Polymer is produced by bacterial fermentation along with addition of selective chemical additives to enable achieve the drilling fluid standards. The important critical parameters such as rheology, crosslinking, performance, solubility, flow ability and salinity tolerance were standardized. The developed product with different compositions has been analyzed at the Institute of Drilling Technology (IDT), ONGC, Dehradun and Oil India, Chemical Laboratory, Duliajan to assess its standard parameters specified by drilling oil companies in India. Result of sample analysis showed encouraging leads in developing XC Polymer.

Once the XC Polymer analysis meets all the prescribed technical standards, TERI will scale up the product. Further commercialization of the Product will be done by OTBL as per the existing Joint Venture Agreement between ONGC and TERI, which will open up new opportunities and revenue stream for OTBL.

### **Additional background information:**

Xanthan Gum was discovered in the late 1950s by US Scientists and is the first biopolymer produced industrially. Xanthan is one of the most extensively investigated high molecular weight polysaccharides and has a molecular weight of about  $2 \times 10^6$  Daltons and is composed of repeat units, comprising glucose, mannose, and glucuronic acid in the molar ratio of 2:2:1. The polymer produced by the bacteria *Xanthomonas campestris*, is obtained by fermentation of glucose, lactose or sucrose. Upon completion of the fermentation period, the polysaccharide will be precipitated by isopropyl alcohol and separated from a standard growth medium. After precipitation, the gum will be dried and get grounded into fine powder form.





Structure of Xanthan gum

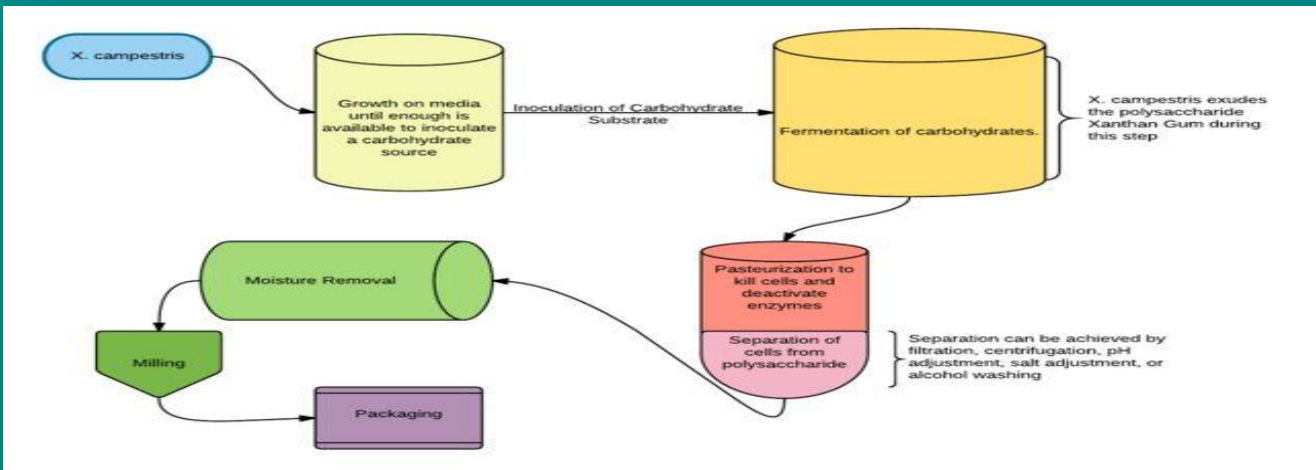


Xanthan Gum power product



Xanthan Gum application in oil well

Process flow chart





## **A New Big Work Order valued at Rs. 52.78 Crore for OTBL, Ahmedabad**

ONGC Ahmedabad Asset has more than 1200 operational Oil producing wells, 28 GGS and number of GCPs, ETPs & CTF within 40-60 km radius of Ahmedabad City. During production of oil, spills which also include leakage of flow lines during transportation of crude oil from well sites to GGS and GGS to CTF stations occur. These spills need immediate remedial action to clean up the contaminated area to prevent environmental damage and as well for keeping the work place clean.

OTBL, since inception in the year 2007 has been utilizing its unique experience of providing Bio-remediation Solutions for treatment of oil spills /oil contaminated soils through environmentally friendly & safe 'OILZAPPER' Technology to ONGC Ahmedabad & other Assets. In addition, OTBL is also extending its services to these Assets of cleaning-up line leakages, transportation of oil contaminated soils/oily sludge to secured pits and restoring oil contaminated well sites, farmers' fields, evaporation pits & well site waste pits etc.

OTBL, Ahmedabad Office has recently been awarded a new Project, "Cleaning, Restoration and Bioremediation of oil contaminated soil to maintain pollution free environmental sustainability around oil fields of Ahmadabad Asset". The Project which is a turnkey one is valued at Rs. 52.78 Crore. The scope of work comprise of 'Cleaning & Restoration' work of 606,199 square meters of area for a period of 3 years and Bioremediation of 146,801 MT of Oil Contaminated Soils for a period of 5 years. Both 'Cleaning & Restoration' Work as well as the 'Bioremediation' Work shall be performed simultaneously. The completion date of the Project is April, 2022.

### **Benefits of Project to ONGC**

- ONGC reduces oil spill area by immediate cleaning action after a spill occurs.
- Due to fast and timely action by OTBL team, ONGC drastically reduces the chances of fire incidents due to oil spill.
- ONGC reduces the operational shutdown due to fast response of OTBL cleaning team.
- ONGC disposes off its oily waste in proper way due to bioremediation technology.
- ONGC reduces production losses due to oil spill problems.
- ONGC reduces LAQ and farmer's related problem by fast restoration of oil spilled farmers' fields.
- ONGC fulfills GPCB and CPCB requirements for safe disposal of oily waste.

### **OTBL Responsibilities under the Contract**

- Cleaning of oil spill sites.
  - Lifting/excavation of oily sludge/oil contaminated soils.
  - Transportation of oily sludge/oil contaminated soils.
  - Refilling of excavated sites with fresh soil.
  - Bioremediation of oily sludge/oil contaminated soils stored at the designated bioremediation site(s).
  - "Oil zapper" application on oily sludge/oil contaminated soils.
  - Collection of samples from bioremediation sites.
  - Tilling of the bioremediation sites.
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- After completion of bioremediation treatment of oily sludge/oil contaminated soils, oil content the contaminated soil must be less than 1%. If not then a Fish Toxicity test will be done by a recognized Lab and submitted along with toxicity results. If toxicity results confirm no toxicity, then bioremediation will be considered complete.
- OTBL will not be liable for any land disputes due to cleaning operations.
- OTBL will not cross check land records or ownership of land which was provided to OTBL for cleaning by work orders.
- Submission of soil sample analysis results to Ahmedabad Asset.
- Arrangement and deployment of adequate number of manpower and equipment.
- Monitoring the rate of Bioremediation.

### Flow diagram of a clean-up operation

Clean-up of Well site, hard surface, concrete surface, water surface
Reporting of oil spills
Bush cutting of oil spilled area
Collection of oily sludge from spill area
Lifting of collected oily sludge/excavation of oily soil
Transportation of oily sludge to storage / bioremediation site
Refilling/Dressing of affected area with good soil
Bioremediation of oily sludge/ oil contaminated soil

### Some Photographs of Oil Spills in farmers' fields in Kalol Area





**OTBL CSR Gujarat initiative 'Protectors of the Environment Phase II'**  
**'Shared Action to Combat Climate Change' 2018-2019**

After the grand success of CSR Initiative 'Protectors of the Environment Phase I', OTBL has launched the Phase II program with commitment to continue its efforts to bring about a change in the mindset and lives of the children and their families in Gujarat towards environment preservation and protection. Phase II uses a more spontaneous mode of interaction, active participation and engagement for the benefit of the children and educators. It is designed to connect teaching and learning processes to child outcomes. The program will address environment issues in correlation to the local issues and motivate children to practice sustainable means of living.

The program is focused on "Climate Change - reflecting into various environmental issues" with the objectives of:-

- **Responsible Action:** help students understand how their decisions and actions affect the environment, builds knowledge to apprehend complex environmental issues.
- **Connecting with Environment:** fosters sensitivity, appreciation, and respect for the environment.
- **Students Empowerment:** promote active learning, citizenship, and student leadership.
- **Correlating with the Curriculum:** correlating environment education with other subjects for interdisciplinary learning.
- **Enhance critical and creative thinking skills:** encourages students to research, investigate how and why things happen, and make their own decisions about environmental issues.

***Beneficiaries and Areas of Implementation:***

The direct beneficiaries of this program are the students and teachers of the middle schools in Gujarat. The schools are mostly Government schools and non-private schools. The implementation of the program in the second year is undertaken in the operational areas of OTBL in Gujarat – Ahmedabad, Ankleshwar and Mehsana. The program is introduced majorly in rural areas and certain semi-urban areas of the identified cities, comprising of 60% participation of rural schools and 40% participation of Semi-urban schools.

***Stages of Implementation:***

'Protectors of the Environment – Phase II' will be implemented in gradual stages to gain overall acceptance and benefit the students in the defined areas.

**1<sup>st</sup> Stage – Planning and Identification:** Identification and Selection of Schools in the Rural and Semi-urban belt of Ahmedabad, Mehsana and Ankleshwar

**2<sup>nd</sup> Stage – Inform and Introduce:** Introduction and project session at the respective schools

**3<sup>rd</sup> Stage – Collaborate and Involve:** Leadership Initiative and community workshop at the respective schools

**4<sup>th</sup> Stage – Evaluate and Acknowledge:** Climate Change Summit, which is conducted to summarize the outcomes of the program and acknowledge the best performers (organized at common venue for one location)

***Project Timeline:*** The program is scheduled to be accomplished within a span of 12 months, starting from May 2018 till April 2019.

Theme:  
Climate Change and its Impact on Environment

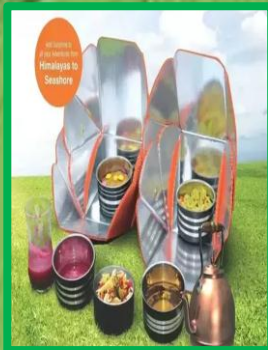


Beneficiary Engagements

Demonstration  
of Solar  
Cooking

Solar Cooker  
Design  
Challenge

Students practice  
with Solar  
Cookers at home



**OTBL's ESTEEMED CLIENTELE**

- ◆ Oil and Natural Gas Corporation Ltd (ONGC)
  - ◆ Oil India Ltd
- ◆ Numaligarh Refinery & Petrochemicals Ltd
  - ◆ Reliance Industries Ltd
- ◆ BG Exploration & Production India Ltd
- ◆ Masila Petroleum Exploration –Yemen
  - ◆ Jindal Petroleum- Georgia
  - ◆ HPCL, India
  - ◆ BPCL Mumbai

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