

Pro Blend[®] PMP (Permeability Modifying Polymer)

Pro Blend[®] PMP is a unique blend of highly specialized nano-polymers, silicon, surfactants and proprietary ingredients blended into a 12% active solution. **Pro Blend[®] PMP** is a multifunctional product that is designed to aid in the enhancement of the oil production by increasing relative permeability as well as reducing swollen clays. Its unique molecular structure coats proppant and the formation leaving a slick coating that improves the relative permeability by wetting the surface and reduces clay swelling by replacing the water in the pore spaces of the clay as well as coating the clay.

Benefits:

- Minimal usages range from 1-5% by weight.
- Creates a nano-film that is generally 50% slicker than substrate
- Pressure drop reduction can reduce scale tendencies
- High absorption and adhesion factor across rocky surfaces
- Does not react with oil in the formation
- Temperature stable to 400°F (204°C)

Applications:

- Enhanced Oil Recovery
- Production Stimulation
- Coating of frac sand
- Added to the tail end of frac fluids
- Enhanced relative permeability in disposal wells

Pro Blend[®] PMP is an efficient and proven product when utilized to increase oil production or dispose of produced water.

Recommended Usage:

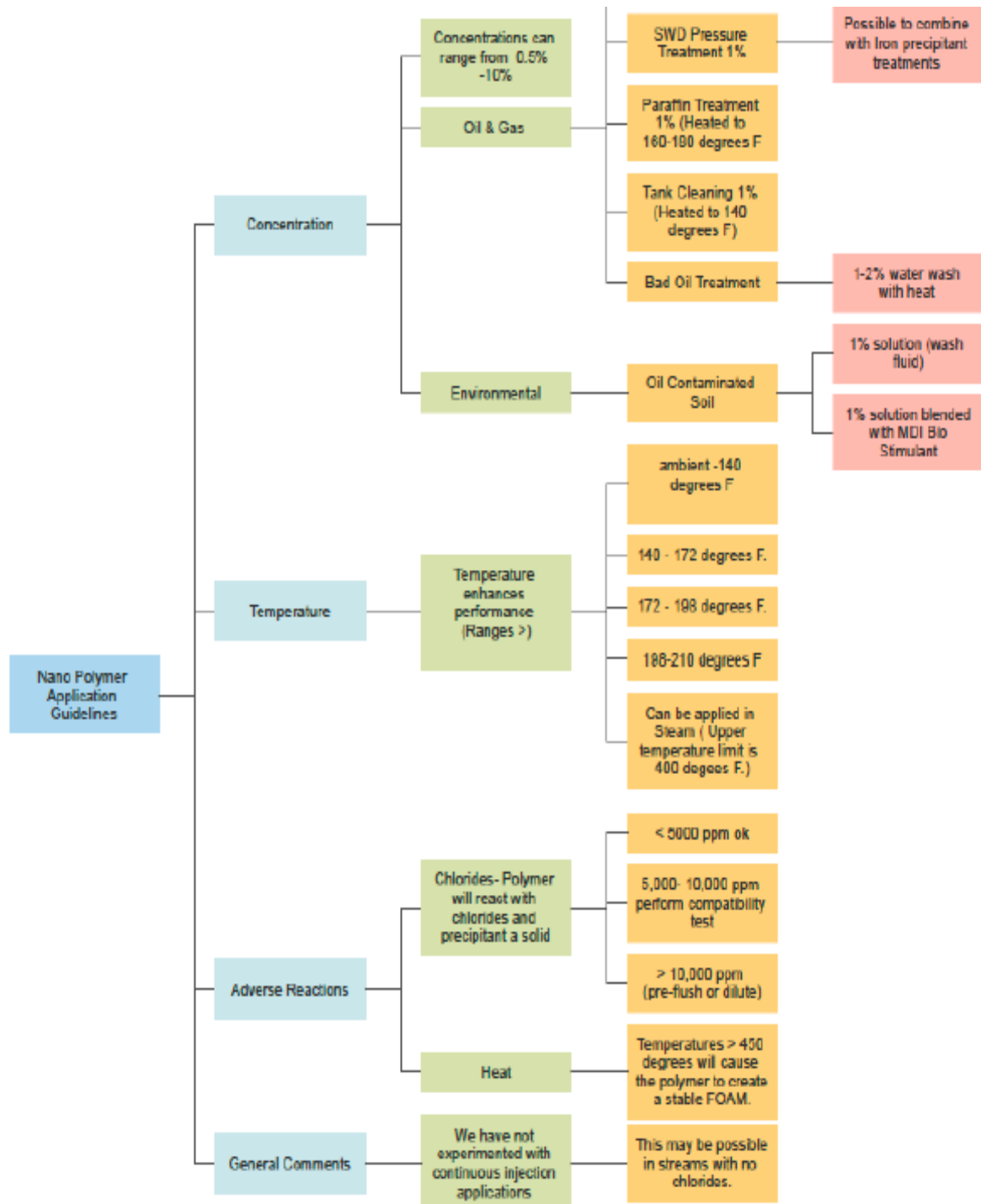
Pro Blend[®] PMP is typically used in a concentration of 1 - 5% by weight and 5 - 10 ft of radial penetration across the zone of interest.

Packaging:

Pro Blend[®] PMP: 275 gallon IBC



Pro Blend[®] PMP Application Guide:



Pro Blend[®] PMP is an organic product manufactured from sodium and silicon metal that is a stable, but oxygen insufficient, complex of silicon in an aqueous solution. **Pro Blend[®] PMP** is non-toxic and non-corrosive. It is safe for those who handle it and for the environment in which is used.

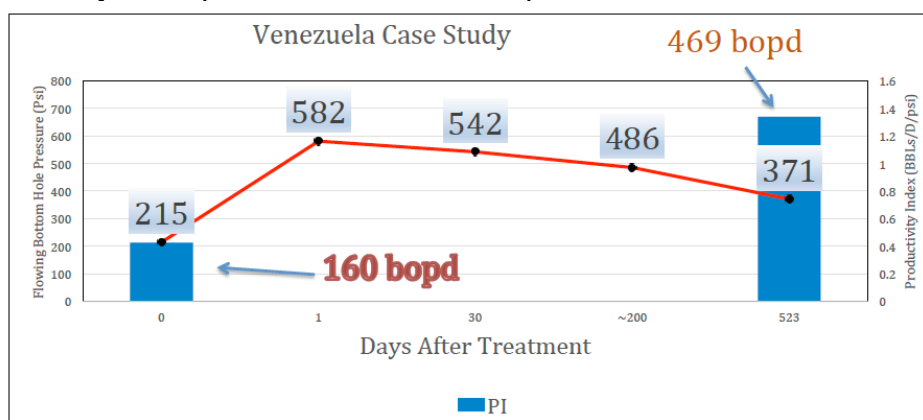
Pro Blend[®] PMP affects the interface between immiscible materials like oil and water. The product reduces the surface tension of oil adhering to the rock matrix and fracture wall and interfacial tension between the phases (Oil/Gas and Oil/Water). The reduced Interfacial tensions result in increased relative permeability characteristics for a given pore structure.

Venezuela Case Study

Well J5 P02 is in the Huyapari Field of the Orinoco Oil Belt. Orinoco oil is some of the thickest crude produced. It's API gravity is 7.5 to 9.5° and centipoise viscosity of 2000-4500 cps.

This project consisted of selecting a well that displayed unfavorable bottom hole characteristics (such as low pump inlet pressure) with the purpose of increasing the bottom hole pressure. This work involved deep well stimulation with the injection of 1000 bbls of water containing 2000 liters (1.3%) of the **Pro Blend[®] PMP**. This polymer is derived from the family of inorganic chemical compounds and its structure consists of either sodium or potassium + sodium + nanoparticles. As a result, the polymer is highly stable and safe, and thereby can easily be applied by diluting it within an aqueous solution and injected through the annulus (between the production tubing and the casing).

The solution was injected for approximately four hours, considering that 1000 bbls were pumped, in addition to the 2000 liters of the **Pro Blend[®] PMP**. The polymer was dissolved in fresh water at a rate of 5 bbls/min and it was left to soak for a period of 24 hours once the injection process had been completed.



Improvements were noted with respect to the following bottom hole conditions: stable operational variables, the restoration of production levels, and an increase in production. The production of this well had fluctuated between 150 and 170 bpd. Upon injection of the **Pro Blend[®] PMP**, production increased to 300 bpd on the day of stimulation. An Absolute Open Flow Potential (AOF) of **190 bpd** was recorded at the well. Once injection began, the AOF shot up to **628 bpd**, which is more than 3 times higher the initial value and an improvement in the useful life of the PCP lift equipment.