



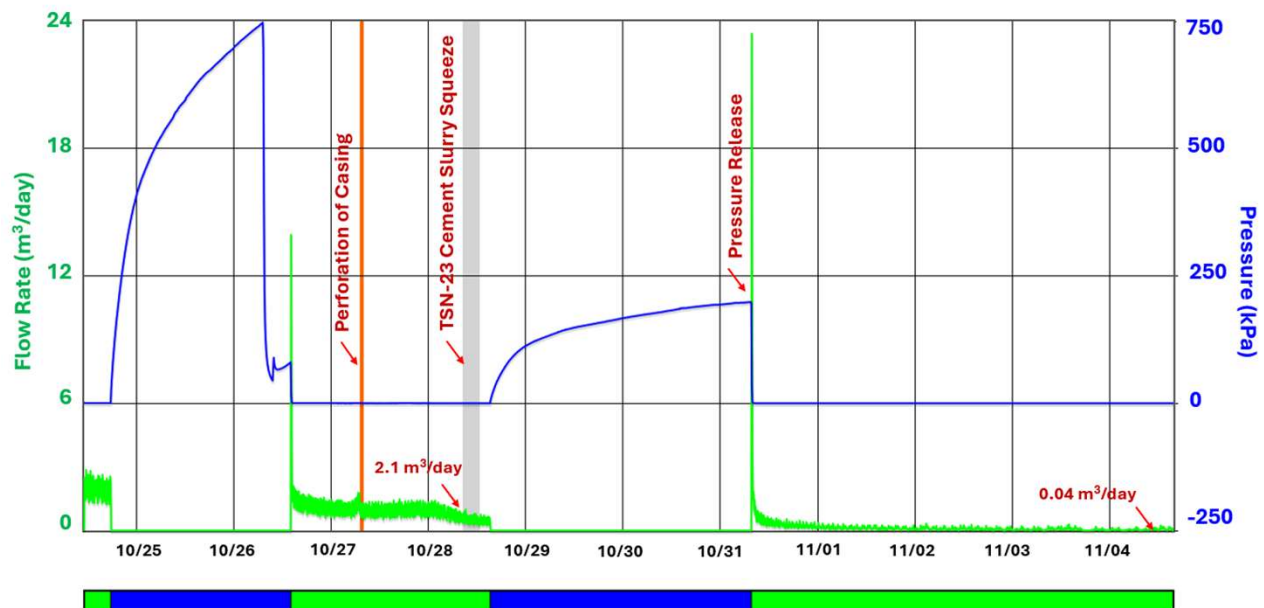
# Case Study: Surface Casing Vent Flow Stopped Using Cement Modifier, TSN-23 to Class G Cement

TS-Nano, in partnership with a leading Canadian cementing company, demonstrated the effectiveness of the nano-modified polymer-class G cement slurry in reducing surface casing vent flow from two wells in Alberta. The two wells were experiencing vent flows of 2.1 to 2.6 m<sup>3</sup>/d. According to the well operator, wells in the area typically required multiple attempts at cement squeeze due to the relatively low downhole temperature of 15 °C and frequent gas breakthrough after cement squeezes. To resolve this, **TSN-23 – our proprietary cement modifier - was blended with up to 3 m<sup>3</sup> of Class G cement without any additional additives, creating a 15.8 ppg slurry** that was effectively squeezed behind the casing.

TSN-23 is a **patented nano-modified polymer** that is mixed directly into the cement blender and is seamlessly integrated into cementing operations to **enhance cement resistance to gas, eliminate shrinkage, and increase ductility and long-term durability.**

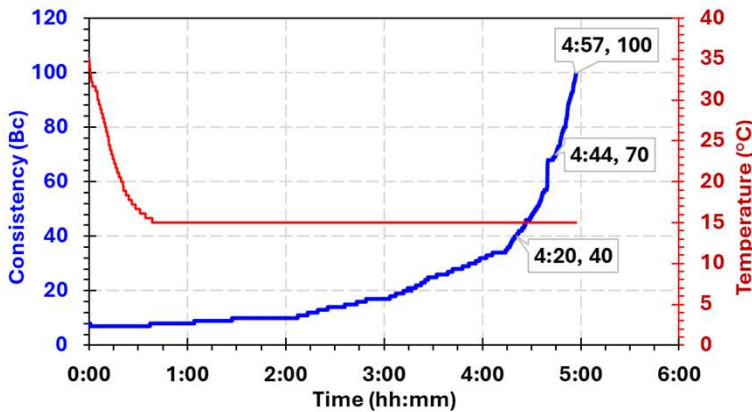
For the first well, 300 L (80 gal) of TSN-23 were mixed with 2.0 m<sup>3</sup> of Class G cement slurry and squeezed through 2 m (6 ft) perforations at ~300 m (1000 ft). **The vent flow decreased from 2.6 m<sup>3</sup>/day to 0.3 m<sup>3</sup>/day after two weeks and continued to decline.**

For the second well, 450 L (120 gal) of TSN-23 were mixed with 3.0 m<sup>3</sup> of Class G cement slurry and squeezed through 2 m (6 ft) perforations at ~300 m (1000 ft). **The vent flow decreased from 2.1 m<sup>3</sup>/day to 0.04 m<sup>3</sup>/day and gas migration to the surface was undetectable after one week. Field observations** from the second well, taken before and after the squeeze, are **shown below.**





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TS-Nano, specially formulated and patented nano-modified polymer (TSN-23), is used to modify all types of oil well cements, including **Class A, C, G, H, and slurries, including fly ash and silica flour blends**, and was tested successfully for **downhole temperatures 10-200 °C**

## Performance Specification (15°C/60°F)

Characteristic*	TSN-23 + Class-G Blend
Density	15.8 ppg
Maximum dial reading (API RP 10B-2)	144
Fluid loss (API RP 10B-2)	32 ml
Thickening time (Controllable)	4:20 HR:MN
Gelation (transition) time from 40-70 BCs	24 minutes
Compressive strength (24 HR)	1,100 psi / 7.6 MPa
Shear bond strength with steel casing (24 HR)	620 psi / 4.3 MPa
Shrinkage strain (24 HR)	0.00
Free Fluid	0.00

*\* No other additives are used with the slurry except TSN-23*

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