

Controlling Fume Generation with TITAN[®] 9000xero[®]



Project Summary

A LOW FUME BULK EXPLOSIVE IDEALLY SUITED TO SOFT WET GROUND

Dyno Nobel developed TITAN 9000xero to provide a practical, innovative and reliable solution for reducing post blast fume (NO_x) when blasting in wet/damp, soft or fractured ground conditions. The product is based on TITAN 9000 emulsion with the inclusion of a bulk additive. The key to the product lies in the replacement of ammonium nitrate (AN) prill with a functional bulk additive, eliminating the potential for water damage to AN prill. The result is a high emulsion content, reduced weight strength bulk explosive.

As the bulk additive has similar handling characteristics to AN prill, it can be stored and transported in a similar manner to AN prill. In addition, TITAN 9000xero can be delivered through a standard mobile processing unit (MPU) into the blasthole via auger or pump.

Extensive trials have taken place at three coal mine sites in Eastern Australia, with extremely positive results. No NO_x emissions have been recorded to date.

Background

SOFT, WET AND FRACTURED GROUND LINKED WITH ELEVATED NO_x EMISSIONS

Blasting in soft, wet tertiary material has been associated with elevated NO_x emissions within the coal mining industry for many years. When blasting in these conditions, NO_x emissions can typically vary considerably, even with the same bulk product type, and thus developing an appropriate mitigation strategy can be challenging.

The replacement of AN prill with alternative bulking additives has been used successfully within the industry for the reduction of fume emissions for many years. However, in some instances the use of these products has created operational impediments.

In 2014, Dyno Nobel was approached by an Eastern Australian coal mine to provide a product solution for blasting in soft, wet tertiary material. The focus of the project was on incorporating a bulk additive replacement that had similar handling characteristics to the AN prill it was

replacing, to ensure that the solution would require minimal changes from an operational perspective. As the bulk additive replacement utilised is also less hazardous and not classified as a dangerous good, no alteration to onsite explosive storage limits was required.



No NO_x when using TITAN 9000xero

Project Goals

ACHIEVE ZERO NO_x EMISSIONS

The main project goals were to:

1. Achieve zero NO_x emissions.
2. Achieve suitable blasting performance.
3. Develop a product that required no alterations to storage and handling equipment.
4. Develop a product that could be delivered through a standard MPU.



TITAN 9000xero is based on TITAN 9000 emulsion, with the inclusion of a functional bulk additive

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Technology Applied

RIGOROUS PRODUCT TESTING

Dyno Nobel's product development protocol requires all products to be blasted in pipes at our R&D test site prior to being fired in the ground. Minimum booster testing and Velocity of Detonation (VoD) measurement provided important information on the performance of the explosive product.

Successful detonation in pipes was achieved, with average VoD measurements of between 4,500 – 5,000 m/s recorded. For 'in-field' product verification of VoD, a ShotTrack[®] was used to monitor blasthole VoD, with average measurements of between 4,400 – 5,000 m/s being recorded.

Blast chamber testing was conducted at our R&D test facility in the US to verify the gas components generated by the explosive product. In addition, during field testing in-field gas monitors were used to collect data. Video recording was employed to enhance post blast analysis of blast cloud generation.



TITAN 9000xero can be delivered through a standard MPU into the blasthole via auger or pump

Value Added

SUPPORTING THE RIGHT TO MINE

The 'Right to Mine' is strongly linked to achieving strict environmental objectives, particularly for those mine sites in close proximity to landholders and townships. For these sites, control over NOx generation is critical to ensure sustainable production and mine longevity.

For the onsite verification of the TITAN 9000xero product, areas with high historical NOx emissions were targeted. These areas typically generated NOx on every blast with ratings from Level 1 to Level 5. The product was tested in a standard operating environment for the mine site, no modifications to blast design with respect to confinement and timing were implemented and, in addition, standard site based loading procedures and sleep times were utilised. The product verification process tracked and delivered 35 consecutive NOx free blasts in eastern Australian coal mines.

The testing has confirmed that Dyno Nobel's TITAN 9000xero is a reliable bulk product solution for soft, wet and fractured ground conditions when NOx emissions must be controlled.

For more information contact your Dyno Nobel representative, visit www.dynonobel.com or call 1800 251 872.



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