

Managing Vibration, Airblast and Flyrock in Remediation Blasting

Dow Chemicals Australia

Site Profile

Dow Chemicals (Australia) is a major hazard facility located in Altona, a short distance from Orica's plant at Deer Park, Melbourne. Dow Chemicals is an international chemical company, which manufactures a wide range of chemicals globally for use in modern manufacturing processes.

The Situation

Dow Chemicals, in their bid to resolve the legacy of contaminated ground water from a previous era, embarked on a campaign of well drilling in order to pump out contaminants from the site. Initial trial work generated limited success. Subsequently, trial work focused on improving sparging efficiency, by fragmenting sub-surface rock using explosives. By improving the permeability of the ground, it was expected to increase the rate of ground-water extraction and speed up the rehabilitation process.

Blasting Issues

The work involved special circumstances, and raised a number of considerations. For example, well casings would need to be drilled into previously blasted ground, and the close proximity of chemical manufacturing processes necessitated the need for a comprehensive risk assessment. The presence of misfired explosives could cause a serious or fatal accident during well sinking. Nearby surface and sub-surface structures required, in some cases, blast-holes to be triple decked and loaded on different reduced levels with exact charge weights to control vibration levels. Managing fly-rock was also of prime importance given the status of the site as a major hazard facility.

Technical Solutions

Following an extensive risk assessment in conjunction with Dow Chemicals, project contractors and neighbouring sites, a number of control measures were agreed upon prior to blasting. These were developed to reduce vibration, eliminate flyrock, and air-blast whilst striving to obtain the best results. In addition to providing technical support for the project, a process was developed in consultation with Dow Chemicals to provide information and notification of

blasting to relevant authorities and the local community.

The small pattern (1m by 1m), presence of water and dynamics of the blasting process upon firing required a unique approach to explosives selection. Blast-holes were loaded using Pentex™ cast boosters, powerful explosives which would resist hydrodynamic dead pressing yet allow acceptable energy distribution without exceeding permitted charge weights. To further reduce the likelihood of a misfire, Dow Chemicals selected Orica's electronic detonator system; i-kon™, over conventional shock tube technology as the preferred initiation system for the project. The two-way communication feature of this system enabled Orica to verify the status of detonators from loading to firing and exclude manufacturing error as a potential cause of misfired explosives. The programmable aspect of the system also allowed the firing sequence design to be changed to novel ways of firing decked charges even after loading. This maximised charge relief, and provided the option of frequency channelling should vibration control become an issue. Finally, information from the loggers and blasters could be up-loaded back into Orica's blast design software: Shotplus-i™ and a print out of the blast generated before leaving site.

Results

Throughout the project, all blasts were loaded and fired without incident or disruption to neighbouring chemical facilities. i-kon™ delivered for Dow Chemicals by reducing their exposure to risk and allowing greater planning flexibility. The absence of delay scatter due to the electronic design of the i-kon™ detonator afforded precise timing and energy control. An essential feature when single deck or blast-hole firing is required.

Acknowledgments

Bryan Goodwin, Dow Chemicals Project Manager stated:

"The first blast was fired with conventional signal tube initiation. Following a successful demonstration of the i-kon™ electronic initiation system, the remaining 8 blasts were fired using the i-kon™ system, as this

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provides a significant safety advantage of being able to determine the operating status of the detonators in the primed holes at the completion of loading.”

“The blasting program was completed safely with no damage to nearby infrastructure”.

Orica would like to extend its gratitude to Bryan Goodwin, Project Manager and his staff at Dow Chemicals (Australia) for their support during the course of the project.

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