

SPRING NOISE CONFERENCE

Going Beyond the Requirements: A Case Study in Corporate Responsibility

Trevor Krawchuck,
Trident Exploration
Suite 1000, 444-7th Avenue SW
Calgary, Alberta T2P 0X8
Office: (403) 770-1799
Fax: (403) 668-5808
tkrawchuk@tridentexploration.ca

Steve Morgan,
Noise Solutions Inc.
Suite 301. 206 – 7th Avenue S.W.
Calgary, Alberta T2P 0W7
Office: 9403) 920-9580
Fax: (403) 234-7304
smorgan@noisesolutions.com

Introduction

Today's gas producers in Western Canada and across North America in general are very heavily regulated and must meet strict government legislation aimed at maintaining safety, protection of the environment, and conservation of the energy resources. Even the potential impacts of energy facility noise on nearby neighbours must be kept to acceptable minimums according to regulations like those promulgated by the Alberta Energy Resources Conservation Board's (ERCB) in Noise Control Directive D-038. This Directive sets out extremely stringent noise levels that cannot be exceeded at the nearest or most impacted residences to an energy facility. However, one energy company, Trident Exploration, made a decision to go beyond the minimum requirements set out in the ERCB D-038 by committing to a receiver noise level that would not only assure its neighbours of a peaceful, quiet environment but would also make the overall production site a quieter work place for their employees. It was also deduced that the reduced noise levels would improve worker safety allowing for improved communications on location thereby reducing the need to constantly wear hearing protection. To achieve these conditions Trident Exploration called upon an acoustic analysis and noise suppression consultant to provide the Noise Impact Assessment and accompanying strategies on how to reach the established targets.

This paper will cover the reasoning and rationale used by Trident Exploration to set its noise reduction targets and the process that it and Noise Solutions followed to achieve success including additional benefits that went beyond expectations.

Overview of Trident Exploration Corporation

The key ingredient of understanding why a corporation goes beyond the normal regulatory requirements is to understand the company itself including its leadership, culture, and vision. The following overview will provide insight into the company and some understanding of how it sees its role as a part of an overall philosophy to responsible stewardship of its employees, shareholders, the environment, and the communities in which it is a part.

Trident Exploration Corporation (TEC), is a natural gas exploration and development company, principally focused on coal bed methane ("CBM") from resource plays in the Western Canadian Sedimentary Basin ("WCSB"). Headquartered in Calgary, Alberta TEC was founded in 2000 with the acquisition of certain working interests in lands in Alberta and British Columbia. In early 2002 TEC, together with the Southern Ute Indian Tribe, who then owned approximately 11% of TEC's common shares and 55% of TEC's preferred shares, acquired property in the Corbett project area and later we formed two joint ventures to explore CBM resources within the Horseshoe Canyon dry coal formation.

TEC is very interested in CBM because it is one of the cleanest burning fossil fuels. The gas is considered to be sweet, meaning it has minimal to no additional gases or chemicals thereby reducing any health and safety issues associated with its production. This is different from sour gas which contains Hydrogen Sulfide (H₂S). Because CBM has relatively little additional gases or chemicals within its composition it requires little to no refining. In other words, from the moment that CBM is first extracted from the coal seams it is ready to heat to your home.

With its principal properties located in Alberta, Canada TEC was one of the first exploration and development companies to focus on CBM resource plays in the WCSB, and as a result TEC has established significant positions in the Horseshoe Canyon and Mannville CBM plays. We believe the coals in the Mannville plays have some of the highest gas content of any coals in Alberta and have structural characteristics that facilitate the production of CBM. In July 2005, along with its partners, TEC established the first commercial Mannville CBM field. TEC also explores for other unconventional natural gas resource plays, including shale gas. TCE also has exploration properties in British Columbia, Canada, the State of Washington and the State of Oregon in the northwest United States.

In early 2008, TEC achieved a significant drilling milestone having operated the drilling of 650,000 meters or 2,100,000 feet of horizontal and multi-lateral horizontal drilling in the first commercial Mannville CBM field in Canada.

With a major stake in the future of CBM development TEC is fortunate to have the leadership necessary to understand and responsibly address concerns communities are expressing about this issue. Current TEC President and CEO Todd Dillabough is an experienced professional with a clear understanding of where the company needs to go. Prior to joining TEC Mr. Dillabough was President, Chief Executive Officer, Chief Operating Officer and a director of Pioneer Natural Resources Canada, Inc., an oil and gas exploration and production company, which was recently sold to TAQA North. He received his B.Sc. with a Geology Major from the University of Calgary in 1984 and is a professional geologist registered with the Association of Professional Engineers, Geologists and Geophysicists in Alberta and is also a former Governor of the Canadian Association of Petroleum Producers. According to Dillabough *"TEC will not be a follower but rather a leader in the development of CBM in North America setting our own bar for conduct that does not stop at the minimum acceptable regulatory requirements and expectations but will define TEC as a respected neighbour in the community."* This attitude is summarized in the TEC Vision statement *"To be the leader in responsible resource development"*. The combination of executive commitment and clearly stated vision helps to set an overall corporate culture that is focused on meeting the direction set for the company.

As a further measure to ensure that this vision and culture are never strayed far from TEC has instituted its own Whistleblowers Policy and Hotline. The purpose of this Whistleblower Policy and Hotline is to provide a mechanism for all staff members, vendors, partners and various other stakeholders to raise concerns free of discrimination, retaliation or harassment.

TEC is committed to social and environmental responsibility. Its operations are conducted with integrity and in accordance with all applicable laws, rules, and regulations. This policy seeks to provide an avenue for users to raise any concerns they may have and to be assured that in making complaints they will be protected from discrimination, retaliation or harassment for raising their concerns in good faith.

All TEC staff members and other stakeholders, including suppliers, creditors and shareholders are bound by the requirements and standards set forth in this policy. Any violator of this policy will be subject to appropriate disciplinary action as necessary.

TEC encourages users of the hotline to report any concerns or issues they have pertaining to:

- a. Accounting, auditing and any other financial reporting irregularities.
- b. Unethical business conduct including, but not limited to, safety, environment, conflicts of interest, theft and fraud.
- c. Violations of the TEC staff member handbook (for TEC staff members only).

Concerns & Issues Around CBM Development

Returning to the subject of CBM development, having covered the internal culture of TEC, it is important to understand that there are many significant issues and negative perceptions surrounding this matter that companies like TEC must overcome. A few of the most significant are listed below:

Well Sites/Pad Sizes

A standard single well conventional drilling site will typically affect a surface area measuring 100 meters by 100 meters. Since CBM wells are usually shallow in comparison to conventional gas, smaller rigs and smaller surface areas may be used. Where coal seams are deep enough to permit directional drilling, drilling pads may be used to house multiple wells. A standard well pad will typically affect a surface area measuring 100 meters by 200 meters. While the original pad site has a larger surface impact, its cumulative effect on the environment is much smaller. Pad sites allow multiple wells to be drilled from one surface area, thereby reducing the total surface area required for gas development. Once CBM drilling is complete and the well is connected to the pipeline, the lease area can be reclaimed to minimize surface disturbance. The Canadian Society for Unconventional Gas estimates that well spacing for CBM operations is likely to range from 2-8 wells per section. While this is higher than one well per section for conventional gas wells, it is similar to the spacing for shallow gas wells, and is the same as conventional oil well spacing.

Flaring

In many cases, flaring associated with Natural Gas from Coal development is very minimal. Most flaring occurs after drilling and prior to tying into a pipeline. This flaring

is legally mandated for safety reasons. Generally, most wells will not flare beyond a week. Since the gas produced is sweet, flaring is typically not a safety or health concern as is found with sour gas productions. Alberta regulations stipulate that all flaring activity must be reported to the Alberta Energy and Utilities Board (EUB).

Plugging and Abandonment

As with conventional gas development, all CBM wells will be plugged and abandoned once all recoverable gas has been extracted. In general, cement is used to permanently seal the flow of gas and water from the coal. Since CBM is currently regulated under the same rules as natural gas, reclamation requirements remain the same.

Noise

Given the reduced spacing for CBM development and low formation pressures it is likely that there will be a more than normal amount of compression required for this type of natural gas production operations. It is well known that compressor noise can affect people in many different ways depending on a number of key variables related to extra-auditory effects and auditory effects on nearby neighbours. There are also the effects of noise on workers (Occupational Noise) however these are more clearly understood and therefore widely regulated. Noise emissions from stationary sources like compressor stations to the environment pose the greatest challenge to industry specifically in establishing and maintaining appropriate limits to ensure there will be no complaints. In Alberta regulations like the Energy Resources conservation board's "*Noise Control Directive D038*" have been designed with noise limits that should achieve an acceptable sound environment but this is not always the case as some people complain of health effects at levels lower than those set by regulations. In fact the World Health Organization defines health as "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." Health Canada accepts this definition and therefore considers noise to be a potential health hazard. That is because noise is generally viewed as one of a number of biological stressors. It is felt that excessive exposure to noise might be considered a health risk as noise may contribute to the development and aggravation of stress related conditions such as high blood pressure, coronary disease, ulcers, colitis, and migraine headaches.

Whether or not environmental or industrial noise by itself can lead to health effects is hard to determine since there are so many other stresses to which people are exposed. This research is difficult to conduct and little has been done in this area. The research that has been conducted is growing and suggests a relationship between some long-term noise exposures and stress-related health effects. Probably the most significant contributor to a stress response due to annoyance from industrial noise for nearby residents is the formation of a sleep disorder or sleep disturbance.

Case Study

TCE is proud of its leading-edge environmentally conscious techniques showed concern not only for its own efficient production, but also for the surroundings of its site. Knowing that prolonged exposure to noise, like that being emitted from the proposed Sandhills site in northeast Alberta, had the potential to cause resident discontent and even potentially detrimental health effects to nearby neighbours. TEC contacted Noise Solutions to address this issue and ensure the contentment of all involved. TEC was focused on maintaining its reputation as an innovator in the area of environmentalism. Together, TEC and Noise Solutions set out to go above and beyond the Energy Resources Conservation Board's Noise Control Regulations set out in D038.

The consulting team, specialists in industrial noise control, noise control engineering, and noise pollution control combined proven noise control engineering with creative innovation to mitigate noise issues. A Noise Impact Assessment Process was used ensuring that a facility is in compliance and that the noise control equipment will meet or exceed all government noise control regulations or performance expectations set for that facility.

From the onset TEC made it clear that the initial objectives for the noise control project would be as follows:

- Ensure that facility meets the EUB's Noise Control Regulations as well as the standards of TCE.
- Ensure that Noise Control Equipment has no detrimental effect on the performance of the TCE Machinery (i.e., ensure noise attenuation while allowing abundant airflow).
- Ensure open communication and customization to meet TCE and stakeholder needs.
- Ensure complete client satisfaction.

The challenge presented by the Sandhills Gas Plant facility were its five separate compressor units each with a CAT3516TALE engine at 1340 horse power and an Air-X-Hemphill 144 ZF Cooler. Adding further noise complications were the Refrigeration and Amine Coolers. In order to fully attenuate all noise sources and problem frequencies that exhibited tonal components, the consultant utilized only the highest performing equipment and tailored it to meet the site's specific needs.

Photo #1



On each of the five compressor units (Photo #1) the consultant installed Acoustical Compressor Buildings, Induced Draft Acoustical Building Ventilation Inlets and Fan Forced Acoustical Building Ventilation Outlets, ensuring superior cooling performance and noise attenuation. For each of the coolers, Horizontal Inlet and Outlet Silencers proved more than efficient at diminishing the excess cooler noise. For the two additional coolers, Inlet and Outlet Silencers were also used. This expert combination of equipment and design customizations brought about outstanding noise reduction results.

TEC firmly believes in the importance of maintaining open and transparent communication with all concerned parties. At the Sandhills Gas Plant site, TEC and their consultant shared all concerns and ideas regarding the noise attenuation of the site, allowing for innovation and ultimately success. The extensive project spanned approximately six months, from December to June. During this time, TEC and its consultant worked closely together to make sure that all objectives were reached.

The customization of the sound-suppression equipment ensured that the client's unique situation was fully addressed (photo #2). Installation of the equipment was professionally supervised and extremely time-efficient, allowing for minimal interference with the sites normal operation. The entire process was expertly executed, proving once more that innovation and ingenuity are necessary requirements in the field of noise suppression. This degree of noise control created an environment that would ensure the contentment of any nearby residents and maintained the surrounding area as an industrial noise free zone.

Photo #2



Summary

The Sandhills Site proved a unique challenge, as its size and contents supplied many noise sources and frequencies to be dealt with. The post project assessment showed that the noise reduction at this site was so successful that TEC has since used it as an example to show potential neighbours of new proposed facilities what is achievable in noise attenuation. TEC and their consultant were able to bring the site well under the regulatory requirements of the Energy Resources Conservation Board, as well as meet the strict performance standards of TEC.

At its current noise level, the site's over-all facility noise production is approximately 44 dBA Leq at the fence-line and below ambient of 35 dBA at the nearest residence (600m North). Innovation and determination by TEC and their consultant to bring about the desired superior results helped to set a high standard in Noise Control for the Oil and Gas Industry.