

BIGHORN SHEEP USE OF A GAS WELLSITE DURING SERVICING AND TESTING: A CASE STUDY OF IMPACT AND MITIGATION

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Abstract: Between May and August 1985, Canterra Energy serviced and tested a 69% sour gas well along the eastern slopes of the Rocky Mountains, 3 km from the boundary of Banff National Park, Alberta. The well had been drilled in 1961 and since then bighorn sheep had used the seepage through the old sump as a mineral lick. During the initial stages of well testing, in May 1985, a surprising number of animals made extensive use of the mineral lick, located 30 m from the well head. Apparently attracted by rig detergent, the animals abandoned the mineral lick and spread over the lease licking pipes and equipment. Immediate mitigation was successful in attracting sheep away from the lease onto surrounding higher elevation ranges. Concerns, field techniques and mitigation are discussed.

In 1985, Canterra Energy Limited serviced and tested a 69% sour gas well located at 2,000 m elevation along the east slopes of the Rocky Mountains in west-central Alberta, 3 km from the east boundary of Banff National Park. The well had been drilled in 1961, but due to its high sulphur content had not been developed. Drilling of the well resulted in an artificial mineral lick located 30 m from the well head. The lick was formed by water seeping through the drilling fluids sump. In December 1984, when Canterra Energy applied to regulatory Government Agencies for servicing and testing the gas well, the number and distribution of bighorn sheep in the region, and the time of the year and the extent of use of the mineral lick, were not known. In order to provide this information, a wildlife monitoring program was initiated. Its two main objectives were to assess the impact of Canterra operations on bighorn sheep and to assist the company in mitigating potential negative impacts. Throughout the period of well servicing and testing (May-September), experienced wildlife biologists monitored the presence and the movements of bighorn sheep in the area on a daily basis.

SEQUENCE OF EVENTS

Since early April 1985, bighorn sheep were observed grazing on the open slopes surrounding the wellsite and using the mineral lick. In May, when Canterra Energy moved equipment on site, the mineral lick was consistently used by herds of rams. The animals were seen within 100 m of the wellhead during road grading and wellsite preparation, during the initial pressure testing of the well and with a service rig on site. Attracted by

the mineral lick, 10 m from the lease boundary, and 30 m from the derrick, rams did not appear afraid of rig operation and noises. Yet, they were continuously alert, frequently running for 5-10 m whenever a sudden loud equipment noise was made.

During the third week of May, the number of animals present around the wellsite increased rapidly. On May 20, a total of 40 rams were counted. Between May 22 and May 25, the number increased to 60 different animals, of which 23 were mature rams. To further compound the situation, the animals began using the wellsite itself. On May 22, several bighorn sheep were observed for the first time licking pipes that had just been cleaned with a rig detergent. On May 23, the animals were more attracted to the wellsite than to the mineral lick nearby. Several herds walked onto the wellsite and spread out over the area among the rig workers.

CONCERNS

The initial use by bighorn sheep of a mineral lick in the vicinity of a critical sour gas well during servicing operations raised a substantial amount of controversy. The presence of animals so close to industrial activities appeared to support the position of numerous individuals in the oil industry that their activities were not affecting wildlife. At the same time, environmental public opinion groups were questioning the wisdom of allowing an oil company to conduct operations in such an apparently sensitive area for bighorn sheep.

From a biological and management point of view, several concerns were identified. Specifically:

1. The animals, when using the mineral lick, appeared continuously tense and alert. This enhanced physiological status, if prolonged, could have a significant impact on the animals' welfare at a time when they had already been taxed by a severe winter.
2. The overriding attraction to the mineral lick and the continuous close presence of people and activities could have led to the habituation of rams to humans. In view of the potential for poaching and harassment, and considering the recreational value of the animals, habituation was not desirable.
3. The use of the area left the animals exposed to minor industrial accidents, which, as unlikely as they were, could not be discounted.
4. Later in spring and summer, more animals, ewes and lambs, could move to the mineral lick, and hence be exposed to the activities at the wellsite.

When the animals abandoned the mineral lick and spread over the wellsite, a major concern overrode all the others. The rams were quite bold and aggressive. They were exposed to industrial accidents and toxic chemicals on site. They were also a hazard and a source of distraction for rig workers, and they were affecting normal well-servicing operations.

OPTIONS

Prior to the animals' attraction to equipment and chemicals at the wellsite, discussions about whether bighorn sheep should be moved away from the area or should be left using the mineral lick were confined to Government and University wildlife biologists and private consultants.

The total absence of baseline data on the yearly use of the mineral lick restricted the number of options available to the following:

1. Stop or delay the well testing operation.
2. Fence the entire area, including the wellsite and mineral lick, with page-wire.
3. Remove the mineral lick through fencing or other means, and bait the animals away onto adjacent valleys with supplementary salt.
4. Remove the mineral lick without replacing it with supplementary salt in adjacent valleys.
5. Leave status quo.

Canterra Energy was prepared to stop or delay the operation if the animals safety could not be insured.

For safety reasons, the second option was unacceptable. In view of the high sulphur content of the gas, in the event of a leak rig workers had to have the option to escape up-wind wherever the conditions of the moment allowed.

The third and fourth options had positive and negative points.

There was no guarantee that replacing the mineral lick with salt boxes, and/or baiting the animals away, was going to be effective. If effective, it could have attracted other animals which, otherwise, would not have moved in the area. Removing access to the mineral lick without providing any artificial alternative appeared to be a long term solution. It was also feared that placing large rocks on the lick or fencing it would have resulted in animals searching for salt on the wellsite itself. This indeed happened despite the availability of the mineral lick.

Leaving the status quo was not favored by Canterra Energy Limited and by Government officials because of repercussions of an unlikely, but possible, accident.

Ultimately, a decision was made to bait the animals from the area without removing the mineral lick. Unfortunately, that decision was reached the day before the rams were attracted to the equipment on the wellsite. At that point, the only option available was to chase the animals away from the wellsite.

MITIGATION

Attempts to chase bighorn sheep off the wellsite proved unsuccessful. Flares, loud noises and people, on foot or horse-back, were effective only in forcing the animals to retreat for a few minutes or to circle around the source of disturbance.

In order to bait sheep away from the site, a large amount of loose mineral supplement was left in 2 weatherproof boxes set on the surrounding slopes, at a 100 m higher elevation, 500 m distant from the wellsite. At that time, the animals were slowly herded from the wellsite to the baited area.

During the following two days, mitigation attempts appeared to be successful. About 60 bighorn sheep were grazing on the surrounding open slopes. Some used the salt boxes, but only 5 rams came down to the wellsite.

When bighorn sheep were back on the wellsite, eating dirt and licking pipes, a single wire electric fence was strung at the edge of the wellsite on the mineral lick side. Initially, that proved effective in keeping the animals off the equipment area. However, the following day, 18 rams and ewes came onto the wellsite from another side not fenced, and, when chased off, ran across the lease and easily jumped the electric wire. Consequently, a second and third bait site, further away from the wellsite, were established. By May 30, 7 days since bighorn sheep began licking equipment on the wellsite, only ten animals still remained in its vicinity. All the others used extensively the salt boxes containing mineral supplement. The salt boxes were gradually moved further away in valleys adjacent to the wellsite basin.

Mineral supplementation boxes were used by bighorn sheep throughout the summer and were successful in keeping ewes and lambs away from the wellsite. In total, over the summer, the animals consumed some 700 kg of salt and supplement. All the boxes were removed in September, when Canterra ceased its operations at the wellsite.

Initially, it was decided to permanently cover the mineral lick by the wellsite. However, after discussions with Government biologists, the lick was left open on the basis of the following considerations:

1. It was a safe source of minerals.
2. Bighorn sheep were highly attracted to the wellsite. Keeping them away from it was the priority.
3. The electric fence on the edge of the wellsite was effective in keeping the animals away from it only as long as they did not want to get in. A similar fence around the mineral lick was not effective. Rams pushed the wire down. Hence, it was feared that removing access to the mineral lick could have led the animals to push their way onto the wellsite.

CONCLUSIONS

The series of events that happened on Canterra Energy wellsite are indicative of the risks associated with oil and gas development on bighorn sheep ranges.

There is a general agreement that the disturbance associated with drilling new gas wells on bighorn sheep ranges can affect animal distribution and habitat use. Unfortunately, the impact of existing wellsites on animal distribution, and the impact of bighorn sheep overriding attraction to minerals used during drilling and servicing, are less appreciated (Morgantini and Bruns 1988). The attraction to salt impregnated soil on wellsite not only can alter distribution and movement patterns, but it can also expose animals to a large array of potentially toxic chemicals. This risk is very high during drilling and servicing operations, when high concentrations of potentially attractive chemicals are present.

On Canterra wellsite, bighorn sheep were so strongly attracted to the rig detergent (Na = 12%, pH = 13.4), that no level of active harassment appeared effective in keeping the animals away from it. A single wire electric livestock fence was also of limited use. Erecting a game-proof fence should have succeeded in making the site unaccessible, but it was not advisable for the safety of the workers servicing the well. In this regard, it would be noted that, at another wellsite, bighorn sheep rams tried to access an open sump pit by striking head-on a just erected 2 m high pagewire fence (Morgantini and Bruns 1988).

The evidence indicates that we were successful in resolving the bighorn sheep-wellsite conflict by extensive baiting and actively herding the animals away. Based on a two years intensive study, initiated when wellsite operations were completed, the animals appears to have re-established their previous distribution patterns. No indication of long term impacts was found. However, we believe that the success of the mitigation is attributable, at least in part, to several factors, such as the physiography of the area, the location of the site, the short term duration of industrial activities, the complete removal of vehicular access afterwards, and the fulltime involvement of wildlife biologists. Therefore, our approach should not be seen as "the answer" to any other bighorn sheep-industrial development conflict. Baiting bighorn sheep away from a site is not a solution because of the potential long term risks involved: altered animal distributions, range depletion, crowding and spreading of diseases, and increased legal and illegal hunting (Morgantini and Bruns 1988). If development of suspended wellsites or drilling on bighorn sheep range is allowed, strict measures should be taken to minimize wildlife-wellsite interactions. Mitigative measures should include the selection of an appropriate construction window (e.g. fall-winter), vehicular access control, avoiding use of rig detergents, effective control of spillage, and pro-active wildlife management. Baseline data on local animal populations and the presence of experienced wildlife biologists are also needed to detect potential problems or to minimize unexpected wildlife-gaswell drilling conflicts.

LITERATURE CITED

- Morgantini, L. E. and E. Bruns. 1988. Attraction of bighorn sheep to wellsites and other man-made mineral licks along the eastern slopes of Alberta: a management concern. Proc. Bienn. Symp. North. Wild Sheep and Goat Symp. 6(in press).