Use of Bentonite for Sealing Farm Dams

With the after-effects of last summers droughts is still being felt, stock water in once again on the mind. We may not be able to control the amount of rain that falls from the sky, but we can do something about retaining water in farm dams. There are many dams out there that continuously leak and become a pressing issue during dry periods.

Sodium Bentonite is an option that can provide dam sealing, where the available soil is highly permeable and/or where less than optimum compaction can be achieved. Many farmers that have used this technique with mixed results. Below gives some thought to proper techniques so as to improve the success rate.

Bentonite is the commercial name for clays that are largely made up of the mineral sodium montmorillonite. When mixed with water these clays are highly expansive and can absorb many times its own weight in water. This swelling action is helpful in sealing pores and cracks in leaking dams. It is available in its natural state or it can be processed into powdered or granular forms. Bentonite is non-toxic to livestock and fish.

To prevent leakage in farm dams or tanks a number of techniques can be used to place bentonite. These include mixed blanket, pure blanket, dispersed blanket and injection/slurry trenching.

The mixed blanket technique

The mixed blanket technique uses powdered bentonite and is suitable in soils with a loose and friable nature – e.g. sandy loam. It is not suitable in heavy soils or soils containing clods of moist heavy clay because it is difficult to achieve a consistent mix with the bentonite. This technique involves levelling out the irregularities in the area to be sealed and removing any weeds, rocks or stumps. The surface is loosened and finely worked up to a depth of about 100 mm using a disc cultivator, rotary hoe or similar implement. The bentonite is then applied evenly at 8kg per square metre (one 40 kg bag per 5 m2) and thoroughly mixed evenly into the underlying fine loosened soil. For small areas this can be done by hand using a rake and for larger areas a disc cultivator or a rotary hoe is preferable. Following mixing the area needs to be compacted using a roller. A sheepsfoot roller is best but the feet need to be shallower than the compaction layer. Compaction will be more successful if the area is slightly moistened prior to rolling. A reduction in seepage of about 90% or better can be achieved with this technique. The effectiveness of the bentonite may reduce over time.

The pure blanket technique

The pure blanket technique is suitable for both heavy and light textured soils. The procedure is to firstly remove weeds, rocks and stumps, and then level and lightly roll the area to be sealed. Then a continuous layer of bentonite is spread over the area to a depth of 25 mm thick. Following this a blanket of 150 mm thick of topsoil, sand or gravel is placed over the bentonite layer and then rolled again. This method has been claimed to reduce seepage by 95% or better.

This method provides a solution to seepage in areas where cracking associated with heavy clay soils is a problem. Again there is evidence that the effect of the bentonite will reduce with time. Care must be taken when covering the bentonite layer to ensure it is not disturbed or penetrated by machinery. This method uses more bentonite than the mixed blanket technique, increasing the cost.

The dispersed blanket technique

The dispersed blanket technique is where the bentonite is spread over the surface of the dam and allowed to settle to the bottom. In sinking to the bottom it is drawn into cracks and seals them. A rate of at least 10 kg per square metre is needed and the granular form of bentonite is preferable.

Results in the past have been variable and often unsuccessful due to insufficient bentonite being used. An indication of the quantities required, is for a dam 20 metres in diameter over three tonnes of bentonite should be applied. This technique is most suitable where there are isolated and obvious seepage points and high applications of bentonite to this point will seal them.

These techniques could also be used for effluent ponds on dairy farms or even below feed pads where effluent seepage into ground water is an issue.

To source additional stock water, look out this summer for green seepage zones and rushes in the up levels on the slopes. These areas provide the opportunity to use horizontal bores that can be then connected to a trough further down the slope. Our comments on these can be found on www.landvision.co.nz.

For more information on bentonite as a dam sealant check out www.bentonite.co.nz.