

# Surveying in The Outback

By Thomas Williams

## Winner of the 2011 Excellence in Surveying and Spatial Information Awards in the category of Mining Surveying

I have come a long way since December 2004 when I first set foot in Australia after graduating with an engineering degree in Minerals Surveying and Resource Management from Camborne School of Mines in Cornwall, England. I thought that all my lessons were over until I came to Australia. How wrong I was! This piece will tell my story from being a new Pommy surveying graduate, learning how to live and work in the Outback and finally tell a bit about the project that I submitted to the Registration Board which gave me my registration and eventually resulted in winning the EISSI Mining Surveying category award.

First though, let me tell you a bit about how I started my journey to be a Statutory Registered Surveyor.

After graduating I was offered a job at a copper mine in Mt Isa Queensland and arrived from the middle of a UK winter, windy wet and cold to the middle of a Queensland outback summer. I was billeted in a house with other new graduates, some of whom I am still friends with to this day, and found that even though the nights were almost as hot as the days, the pool was forbidden after dark. "Why?" I asked in my best Pommy whine. The answer was that snakes get hot too and you don't get in the pool if you can't see what's in there with you!

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This Pom's next shock was how big the country was. I came from a country where everywhere is less than a day's drive away, and arrived in a country where nothing is less than a day's drive away. This was brought home to me one Friday afternoon when I decided to go to a barbecue that evening in Kalgoorlie until I found out that the town was three day's drive away. It didn't look that far on the map! That was really when being in the outback hit me.

Coming from a small overcrowded country where it is impossible to be on your own, to a place like the outback where there is literally no-one for hundreds of miles, makes you feel insignificant and small. When I arrived in Oz I was edgy and tense but pretty soon discovered that the only way to live in the outback is to relax and take each day as it comes. In Australia everyone says "No worries". In the outback they actually mean it.



One day I had my GPS going and was wandering about waiting for it to register and saw some loose sticks on the ground. I didn't really think anything of it until one of the sticks started moving towards me. I still didn't really take in what was happening but then realized what was happening and just turned around and ran. As I did so, I noticed that the snake did the same. Looks like he was just as frightened of me as I was of him! The outback didn't seem so intimidating after that.

Even though I love going into the cities for some luxuries sometimes, you can't beat living in the small towns with just a couple of minutes drive to be in the middle of red dust and nature. Working in the outback means you can do a hard day's graft, then knock off and go to the lookout and just unwind before going for a beer.

You have to be prepared for the inconveniences of being in the bush however. 'Next Day' delivery in the outback is different if you live further than 400 kms from a city. In NSW, 'Next Day' delivery goes from Sydney to Dubbo and then sits there for 3 weeks. You have to factor this into deadlines for when a piece of kit breaks down and you have to hire a replacement.

Anyway you will guess from this that I started off being a bit nervous about the outback but now I just love it.

Let's get on with the story.

After about 18 months in Mt Isa I headed south to a copper mine in NSW and then on to Cobar where I worked for CSA copper mine. It was here that I became an Australian citizen and started to work towards my Statutory Registered



Mine Surveyor qualification. This is where I did the project that was my submission to the Registration Board.

When I started to work towards my Registration in 2007 my employer at the time, CSA Mines, quite rightly wanted me to do a project that would benefit them. They wanted me to ensure that CSA became compliant. The project was done when I had a few free hours here and there away from my usual duties and was finally completed in 2010.

It is commonly known in the mining industry that metalliferous mines are not as compliant as coal, this is unacceptable and compliance must be achieved by everyone. My Registration project which started off as quite an innocuous piece of work pretty soon showed that a metalliferous mine was unable to pass Class D accuracy. It became my task to prove that point and suggest recommendations

- o Challenge practical application of S&DD.
- o Assign recommendation to new Class D.
- o Describe why metal mines cannot pass Class D accuracy.

The idea behind it was to show that the standard equation used in testing compliance to Class D accuracy, although satisfactory in coal mining was inadequate when applied to metalliferous mines. I had to prove that the current 2 dimensional line equation should be changed to a 3 dimensional one to take into account depth; a characteristic of metalliferous mines compared to coal. The work involved much historical archive searching as well as practical surveying and office based number crunching.

From the work done in my registration project it was clear that the definition of Class D for mines as prescribed by the Mining Surveying & Drafting Directions 2001 did not take into account the 3D environment.

Using the equation for residual error  
 $r = d (c + 0.2)$

it was observed that  $c$  was any value for metalliferous mines and was only regarded in 2 dimensions whereas the coal industry has a minimum of 1 km for  $c$ . This is equivalent to a maximum allowable relative precision of 60mm. The Surveying & Drafting Directions 2001 for metalliferous mining did not state a minimum value for  $c$ , so zero was adopted. Class D compliance was therefore not achievable in metal mines due to its minimum of zero.

The usual foot print of workings in a 2 dimensional plane is less than 1 km for most metal mines meaning that the calculated residual error is too small to be practically achievable. Additionally the interaction between levels means stations do not increase their distance away from each other in a 2 dimensional distance, only in a 3 dimensional state.

Continuing to mine deeper could mean that the mine would not pass even the 60mm allowable error if 1 km was not adopted for minimum amount. It can clearly be seen that for a metalliferous mine to achieve a Class D pass as it becomes deeper, a further modification to the regulations would be needed, one in which the minimum distance  $d$  becomes a slope rather than level distance.

The equation for a displacement used to be:

$$\text{Displacement} = \sqrt{(x^2 + y^2)}$$

In order to allow for the slope the equation became:

$$\text{Slope Displacement} = \sqrt{(x^2 + y^2 + z^2)}$$

where  $x$ ,  $y$  and  $z$  are the distances moved in the corresponding axes.

The slope displacement vector was adopted to give allowance for the 3D nature of metalliferous mines and the cluster and interaction of its stations in relation to each other.

To summarise, my findings proved that for a metalliferous mine to comply with Class D, the vertical vector must be incorporated into the displacement equation and the coal industry minimum value constraint of 1 km must be incorporated into the residual error formula for metalliferous mines.

My project did not instigate the change in the compliance equation however it did prove that a three dimensional line equation could work. Towards the end of my project, the legislation regarding compliance was finally changed to take into account the three dimensional component and residual error constraint.

In 2010 I decided to have a rest from metalliferous mining for a while and went into coal mining. I started by working for a small colliery before joining a larger concern in Mudgee. In 2011 I set up my own company Precise Observation Mining Solutions (P.O.M.S.) and now work for metalliferous and coal mines as a contractor.

I would like to take this opportunity to thank all my family, friends and colleagues who gave me support during the project and the sponsors and officers that make the EISSI awards possible. ■

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