



*“NZ Mine Plan Management Project
Issues with Mine Plan Rectification”*

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Presentation Outline

- **Introduction**
- **NZ Mine Plan Management Project**
- **Historic Mine Plans – Legacy Data**
- **Issues with Mine Plan Rectification**
- **How “Good is good” with Spatial Accuracy**
- **The Way Forward**
- **Conclusions**



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- Subsidence investigations
- Collapsed mine workings
- Volumes of voids

NZ Mine Plan Management Project

The Background

- Pike River Mine Disaster 2011
- Royal Commission into Pike River Disaster
- WorkSafe New Zealand
- High Hazard Unit
- Mining Regulation 2013
- Principal Hazard Management Plans
- Principal Control Plans

Pike River Coal Mine Disaster



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Pike River Royal Commission

Royal Commission - 16 Recommendations.

The New Zealand Government agreed to
Implement all the Recommendations

Recommendation 1:

To improve New Zealand's poor record in
health and safety, a new Crown agent focusing
solely on health and safety should be
established.



WorkSafe New Zealand

WorkSafe New Zealand created to oversee all
Health and Safety in the Workplace

The High Hazards Unit (HHU) within WorkSafe
oversees the “High Hazard” industries like Mining
and Forestry

“Health and Safety in Employment (Mining
Operations and Quarry Operation) Regulations”
introduced in Dec 2013



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Worskafe New Zealand

- Safety Critical Roles
- Health and Safety Management System
- Principal Hazard Management Plans
- Principal Control Plans
- Worker Participation Systems
- Specific Duties in all Mining Operations
- Specific Duties in Underground Mining
- Notification and Reporting

- Senior Site Executive
- Mine Manager
- Electrical Superintendent
- Mechanical Superintendent
- Mine Surveyor
- Ventilation Officer
- Supervisors

Regulation 28 (Section 5)

Unless expressly authorised by WorkSafe, no underground mining operation or tunnelling operation may operate for longer than 28 days without a person holding the position of mine surveyor.



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Principal Hazard Management Plans

Any hazard arising at any mining operations that could create a risk of multiple fatalities in a single accident or a series of recurring accidents at the mining operation in relation to any of the following :

- 1)Ground or Strata Instability
- 2)Inundation and Inrush of any Substance
- 3)Air Quality and Gas Outbursts
- 4)Fire or Explosion or Spontaneous Combustion

Regulation 71 (Section 2)

A principal hazard management plan in relation to ground or strata instability, must, at a minimum, address the following :

(b)(ii)

the surrounding workings, including abandoned or previously excavated workings

Regulation 73 (Section 2)

The suitably qualified and experienced person must include consideration of the following in the review :

- (a) Any plans of the mining operation, made and kept as required under these regulations :
- (b) Any relevant historical mine or survey plans

New Zealand Mine Plan Management Project

- 1) Locate all remaining NZ historic mine plans in archives, museums and public hands
- 2) Catalogue all located mine plans
- 3) Prioritise the most important mine plans
- 4) High resolution scan the prioritised plans
- 5) Georeference the scanned the mine plans as needed by Industry or Worksafe
- 6) Create a public access website of all mine plans







Rectification of Historic Mine Plans

Broad Location Definition

Land District

Survey District

Block

Section

Mine Survey Standard Definition

Tenement Survey by Registered Surveyor

Mine Tenement Plan

Survey Office (SO) Plan Registration

Survey Traverse – Energetic Mine 1896

TRAVERSES of *Boundaries* marked *Reefton* District, Block ~~XIX~~, Section 201 707
formerly Secs 75 & 167

COR.	SURVEYOR'S No. of Pegs on THIS STATION.*	CARDINAL BEARING.	TRUE BEARING.	MEASURED DISTANCE.	TRAVERSES OF EACH DISTANCE.				TOTAL TRAVERSES FROM TRIG. P.				REMARKS.		
					On Meridian.		On Perpendicular.		On Meridian.		On Perpendicular.				
					N. Links.	S. Links.	E. Links.	W. Links.	N. Links.	S. Links.	E. Links.	W. Links.			
<i>Energetic Mine Consolidated Gold Fields of New Zealand - L. Applicants</i>															
		NE	73 01	241	70.4	230.5		70.4	70.4	230.5					
		SW	269 50	975.5	2.8		975.5	67.6	67.6		745.0				
			269 50	36.0	0.1		36.0	67.5	67.5		781.0				
		NW	359 56	1000.0	1000.0		1000.0	1.2	1067.5		782.2				
		NE	51 25	241.8	213.2		267.2		1280.7		515.0				
		N	360 00	1070.0	1070.0		0.0		2350.7		515.0				
		E	90 00	1073.5	0.0		1073.5		2350.7		555.5				
		E	90 00	1355.0	0.0		1355.0		2350.7		1913.5				
		SW	184 40	561.0		559.1		45.6	1791.6		1867.9				
		"	268 40	200.0		4.6		199.9	1787.0		1668.0				
		SE	172 43	1001.0		992.8	126.9		774.2		1794.9				
		SW	180 11	843.6		843.6		2.7		49.4	1792.2				
		W	270 00	779.0		150		779.0		49.4	1013.2				
		NE	0 02	114.3	114.3		0.1		64.9		1013.3				
		NW	270 23 30	783.0	5.3			783.0	70.2		230.3				
					2402.9	2402.0	2022.7	2222.9							
										56.1.37 ✓ Total + Check 1000th <u>2.1.37</u> 54.0.00					

* Note that Surveyor's numbers should be seen on back of pegs in Roman figures, and distinct from branded section numbers in front or side of pegs.

John W. Montgomery D.S.
 Reefton 1896
W.K.D.
 [4991-95] *E.W.D.*
 11/10/96



- ❑ New Zealand is divided into 12 Land Districts
Each Land District was divided into Survey Districts. Each Survey District was 12½ miles sq.
- ❑ Each Survey District was divided into 16 Blocks
(Each block numbered by a Roman numeral I – XVI). Hence block was 3 1/8 square.
- ❑ A mine or mine tenement would be described :
Section 15, Block XVI, Reefton Survey District



- ❑ The local Mining Warden would be required to have the mining tenement or section have a boundary survey undertaken by a registered mine surveyor
- ❑ The boundary survey would then be drafted up as a “Mining Plan” and registered with the local Lands and Survey Office.
- ❑ The historic mining plan and the related survey traverse information, hopefully, have survived and remain lodged in legacy documents

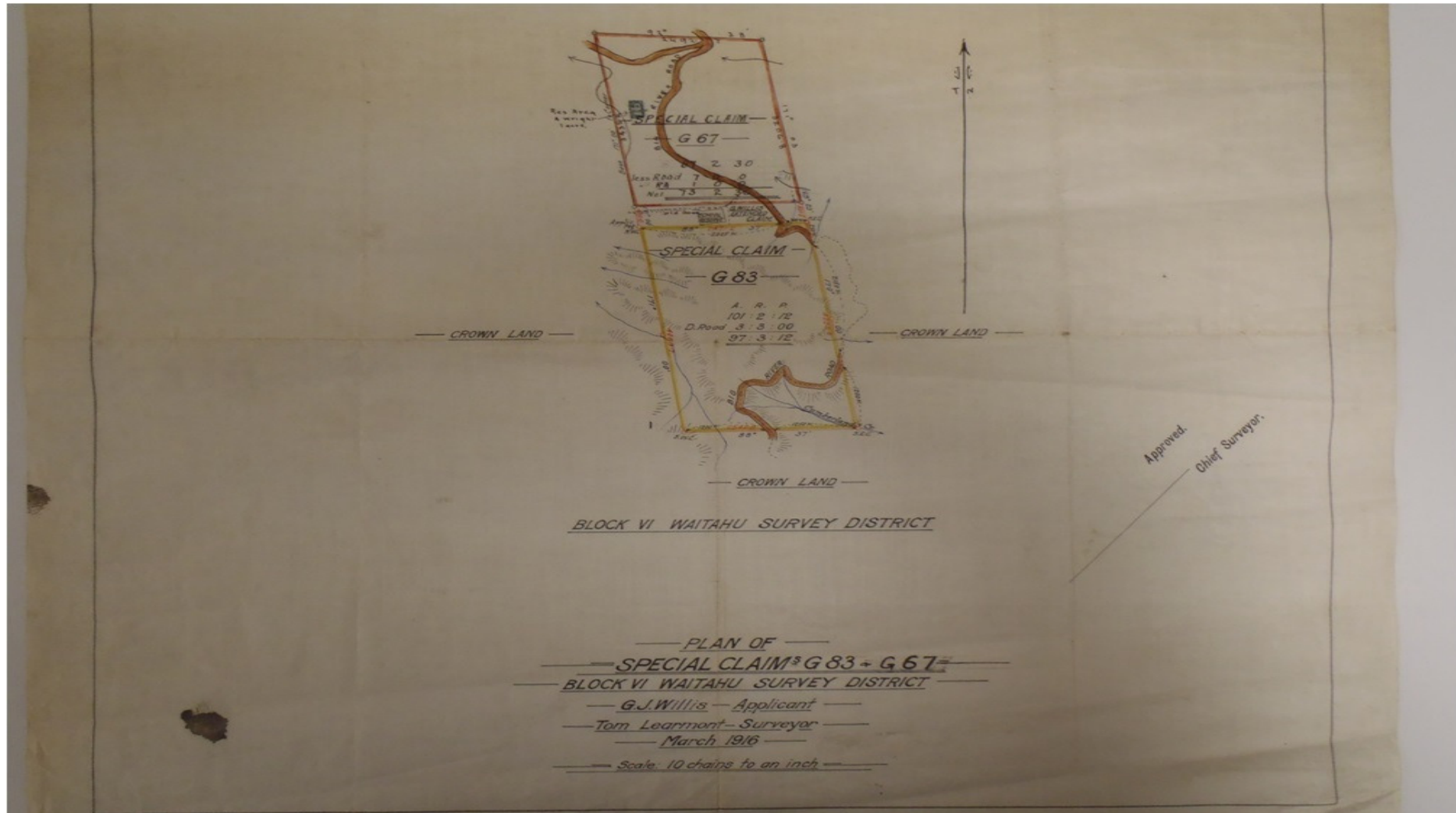


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Rectification of Historic Mine Plans

- ❑ New Zealand has been fortunate in that all the Mining Acts and the current Crown Minerals Act have required all mine plans to also incorporate the overlying or surrounding mining tenement, either in part or the whole boundary.
- ❑ Hence surviving Mine Tenement Survey Data becomes critical to rectifying these historic mine plans and relocating this data is a major phase of the Mine Plan Management Project.

Special Claim Survey



- 1) Scan to High Resolution (minimum 300dpi)
- 2) Many plans are old and fragile - scan once and once only
- 3) Use non-invasive rather than mechanical scanners where possible.
- 4) Save the raw scan files as TIFF images and only image compressed them and thumb nail them later.

How 'Good is Good' with Rectified Mine Workings

The following factors need to be remembered when working with old mine plans :

- 1) Available plan - the last mine plan or not?
- 2) Closing mines often skimmed on surveys
- 3) Many mine plans were tape & compass work
- 4) Survey traverses not closed and corrected.
- 5) Incremental survey error compounds over time

Legacy Issues with Historic Mine Tenement Survey Data

In New Zealand the original

- ❑ The Lands and Survey Office (L&S) became The Department of Survey and Land Information (DOSLI) which itself become :
- ❑ Land Information New Zealand (LINZ)

Legacy Issues with Mine Tenement Survey Data

Each time the Statutory Survey Office was restructured, the following occurred :

- 1) Legacy records were downsized by being destroyed or lodged with Archives New Zealand, the Government Archives
- 2) There was a loss of institutional knowledge with surveyors being replaced by white collar office staff and IT professionals.

The original Mining Wardens Courts were disbanded in the 1970s.

The original Mines Department became the Energy and Resource Division of the Department of Energy which then became Crown Mines, part of the Ministry which then became New Zealand Petroleum and Minerals (NZP&M), which is part of the Ministry of Business, Innovation and Employment (MBIE)



Apart from the numerous restructures and the associated loss of institutional knowledge, the New Zealand Mining Administrators and Regulations suffered from the following past government decisions.

1) Only the NZ coal mining industry was brought under government ownership in 1947-1949

2) There were never any mining regulations to require mines to lodge their final closure plans with a government department

Where to from Here?

- 1) In New Zealand there is a need to regenerate a lot of lost institutional knowledge. Much of the legacy survey data still exists but has fallen below the surface of the current custodians.
- 2) Establish data tables linking the original mine tenement (lease/licence) number to the online SO plan number or survey traverse data where no SO plan exists

Blackball Coal Mine, Plan





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Questions ??

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