

INSTRUCTIONS FOR USE



If you have accessed this Worksheet via a "link we suggest you save a copy to your PC/LAN under a unique file name. This will prevent you overwriting saved data.

Element Worksheet

Ensure that the "key elements" are entered into the Elements worksheet prior to commencing the Risk Assessment

Summary Worksheet

Insert Area/Item Reviewed, Objectives, Facilitator, Participants in the headings provided prior to the Risk Assessment workshop.

Risk Register Worksheet

The column headings identify the Risk Management process stages.

Additional guide notes "Drop down" whenever the cursor is rolled over the yellow "heading" area.

To start a new line in the same cell (i.e. A carriage return) use **ALT+ENTER**.

Relevant Risk Management "Risk criteria" may be accessed by tabbing the "Criteria Tables" worksheet tab.

NOTE: Do not "Delete" any Rows or Columns or rename worksheet tabs as this will render the automatic functions inoperable and the data inaccurate. To remove data from cells use the "Clear Contents" command, (by highlighting the data and Rt clicking the mouse). To add a row (i.e. to insert additional risk/s at a later time), enter data in the last empty row. Add the relevant "Reference No" then use the "sort" option (data menu) to reorder the risk/s in ascending order.

Risk Assessment Management Summary



Location Anglesea **Date** 10/07/2015

Area/ Item Reviewed

Anglesea Mine Fire Risk Assessment - from Shutdown 31/8/2015

Objectives/Scope

To identify possible ignition sources of a fire in the Anglesea mine (internal or external source) and station following shutdown on 31/8/2015, understand the potential EHS risks associated with each, and to review and determine suitability of the controls and countermeasures to mitigate identified risks. Identify improvement opportunities for implementation where appropriate. This assessment based on an expected target state of ensuring all horizontal coal surfaces are covered by approximately 1m overburden by August 31 but that a section of west wall (approx 850m long by 5 - 10m high) remains uncovered as part of the overall Anglesea shutdown plan.

Team leader	Chris Rolland
Facilitator	Warren Sharp
Participants	Mills, Lisa; Rolland, Chris; Hutton, Bryce; Nixon, Graham; Darrel Linke; Sharp, Warren

Assessment Executive Summary

This risk assessment was undertaken to identify potential causes of fire at the Anglesea mine (and station) following permanent shutdown on 31/8/2015, quantify the risks associated with each, and identify any actions/countermeasures to appropriately manage/mitigate these risks.

- History: Over 46 years of operation Anglesea has only had three open flame coal fire events, each has impacted a very small area, and been extinguished within hours of being detected using Alcoa resources. Sections of the west wall have been open for up to 28 years without any spontaneous combustion events. Ash Wednesday (1983) resulted in several small spot fires on the horizontal surface that were quickly extinguished following the fire front.
- The risk assessment identified 6 potential sources of risk of coal fire ignition (elements)
- The risk assessment for each element did not identify any high risks.
- One medium risk was identified related to Image and Reputation risk (reflective of the team/community heightened sensitivity to this issue following the recent Hazelwood Mine fire).
- All other risks were rated low including for EHS related issues.
- The risk assessment did highlight the need for robust controls to be developed and in place prior 31/8/2015, this included review and updating of various procedures/SWI's, close consultation with various stakeholders (ie CFA), ongoing provision of resources to mitigate an event should it occur, ongoing daily inspection regimes to detect any potential issues or events as early as possible, etc. Key follow up actions and improvements were noted as listed in the Risk Treatment Plans.
- Shutdown planning should include a review and implementation of each of the identified actions.

Expected Benefits & by When

Improved understanding of potential sources of fire risk at the Anglesea mine and station following the permanent shutdown on 31/8/2015, and ensuring appropriate and thorough controls/countermeasures are in place prior to 31/8/2015 reducing fire risks to an acceptable level for Alcoa and the community.

Key Risk Treatment Plans

More detailed plans in the Risk Assessment

	Person Responsible	Action Date
Refer to action items as detailed in the Risk Register worksheet	Various	31/8/15

This Review Date 12/6-10/7/15 **SPA for improvements** Chris Rolland

Follow Up Date Weekly to 31/8 **Management Approval** Warren Sharp

Bob Barry Witness Statement - Attachment J.xls

Element Number	Key Element																	
1	Coal Fire as result of Bush Fire																	
2	Coal Fire as a result of Spontaneous Combustion																	
3	Coal Fire as a result of Hot Work activity, Machinery Fire, Smoking, Overhead Electrical Fault																	
4	Coal Fire as a result of Deliberately Directly lit fire, Direct Lightning Strike																	
5	Fire within any area of the plant site including the fenced area and disturbed mine area																	
6	Fire associated with future remediation work																	
7	EIt 7																	
8	EIt 8																	
9	EIt 9																	
10	EIt 10																	
11	EIt 11																	
12	EIt 12																	
13	EIt 13																	
14	EIt 14																	
15	EIt 15																	
16	EIt 16																	
17	EIt 17																	
18	EIt 18																	
19	EIt 19																	
20	EIt 20																	

Risk Assessment																								
Elt ID	Key Element	Ref	Event/Aspect	Cause	Existing Controls				Consequences						Probability Rating	Risk Rating					Adequacy of Controls	Risk Treatment Plans	Person Responsible	Action Date
					Prevention	Detection	Protection	Mitigation	Impact Areas							Impact Areas								
					Designed to prevent event occurring	How do you know an event has occurred	Automatic	Requires people intervention	Health And safety	Enviro	Regula	Image	Financ	Health		Enviro	Regula	Image	Financ					
1	Coal Fire as result of Bush Fire	1.00	A bushfire in the Heath that results in spotting/ember attack to coal covered by approx 1m overburden resulting in coal fire(s) on a horizontal coal surface.	Lightening, Deliberately lit, an external cause within the Heath. This is NOT A CREDIBLE EVENT given that all horizontal coal surfaces will be covered. Not assessed further.	Strategy to ensure all horizontal coal surfaces covered by approx 1m OB by 31/8 (including haul roads, any loose fines), preventing ember contact with coal surface.	N/A	N/A	N/A	N/A												Adequate	Ensure all horizontal coal surfaces are covered by approx 1m OB per the current strategy. Establish future integrity inspection and maintenance procedures for movement/erosion of the cover. Arrange an independent review of the coal covering strategy.	CR	31-Aug
		2.00	A bushfire in the Heath that results in spotting/ember attack to coal on the west wall (approx 850m long by 5 - 10m high) resulting in coal fire(s) on a steeply angled coal surface. NOTE: sections of this area exposed for up to 28 years without any events including Ash Wednesday.	Lightening, Deliberately lit, an external cause within the Heath.	Steeply angled slope, orientation to likley direction of attack, minimal fines build up due to age	Ongoing 24/7 security, onsite Alcoa supervisory resources...both to identify event/risk and trigger appropriate response plan including response with local authorities. notification from external parties in advance of bushfire (DELWP, Parks, CFA), inspection after fire front passes	N/A	Procedures and SWI's to be in place, Onsite Alcoa supervisory resources to be in place, Equipment to be retained, Resources to operate to be established.	1	1	1	3	1	D	Low	Low	Low	Medium	Low	Adequate	Review/update Ang Emergency Plan, Review/update CFA PIP, Review/update SWI for Management of Hot Coal and Coal Fires, Review/update OPG024 for bushfires...for appropriate response from August 31. Review with CFA. Ensure ongoing community engagement and communicate actual risks, Ensure appropriate equipment retained from 31/8, Ensure resourcing for operation of retained equipment. Review external notification process DELWP/Parks/CFA others is established	CR	31-Aug	
		3.00	A controlled burn in the Heath that results in spotting/ember attack to coal on the west wall (approx 850m long by 5 - 10m high) resulting in coal fire(s) on a steeply angled coal surface. NOTE: sections of this area exposed for up to 28 years without any events including Ash Wednesday.	Controlled burn that escalates due to change in weather conditions	As above plus controlled burns are planned carefully in advance dependent on favorable weather conditions	As above plus Alcoa is notified in advance by email as part of a notification list of landholders of controlled burns by DELWP, and will be notified if a burn escalates	DELWP, Parks, CFA procedures in place	As above	1	1	1	3	1	E	Low	Low	Low	Low	Low	Adequate	As above plus confirm notification processes and Alcoa contacts with DELWP for controlled burns and also in the event that a controlled burn becomes uncontrolled.	CR with EJ	31-Aug	
2	Coal Fire as a result of Spontaneous Combustion	1.00	Spontaneous combustion in coal covered by approx 1m overburden. NOTE: only 3 open flame events in 46 years of operating history,	Spontaneous combustion requiring heat, O2 and fuel (ie coal)	Strategy to ensure all horizontal coal surfaces covered by approx 1m OB by 31/8 (including haul roads, any loose fines), to limit O2 supply and also preventing exposure to radiant heat source (ie sun)	NOT EXPECTED TO OCCUR based on history and strategy to cover and that no open fire is expected through 1m OB cover however detection would include: Detection expected via heat/steam/ possible smoke/odour giving time to detect and respond, Observation by onsite security/Alcoa supervisory resources via daily inspection regime	N/A	NOT EXPECTED TO OCCUR based on history and strategy to cover however mitigation would include: Procedures and SWI's to be in place, Onsite Alcoa supervisory resources to be in place, Equipment to be retained, Resources to operate to be established.	1	1	1	1	1	E	Low	Low	Low	Low	Low	Adequate	As per risk items 1.1 and 1.2 above			
		2.00	Spontaneous Combustion in coal on the west wall (approx 850m long by 5 - 10m high) NOTE: sections of this area exposed for up to 28 years without any events	As above	Minimal fines build up due to age, daily inspection regime from onsite resources to be established	Detection expected via progression through phases of steamy, smoky and then fire gives time to detect and respond, Observation by onsite resources, daily inspection regime from onsite resources to be established	N/A	Procedures and SWI's to be in place, Onsite Alcoa supervisory resources to be in place, Equipment to be retained, Resources to operate to be established.	1	1	1	2	1	E	Low	Low	Low	Low	Low	Adequate	As per risk items 1.1 and 1.2 above			

Risk Assessment																								
Elt ID	Key Element	Ref	Event/Aspect	Cause	Existing Controls				Consequences						Probability Rating	Risk Rating					Adequacy of Controls	Risk Treatment Plans	Person Responsible	Action Date
					Prevention	Detection	Protection	Mitigation	Impact areas							Impact Areas								
					Designed to prevent event occurring	How do you know an event has occurred	Automatic	Requires people intervention	Health And safety	Environ	Regula	Image	Financ	Health		Environ	Regula	Image	Financ					
3	Coal Fire as a result of Hot Work activity, Machinery Fire, Smoking, Overhead Electrical Fault	1.00	Maintenance activity involving hot work (welding, cutting, grinding), OR a machine catches fire OR a discarded cigarette OR electrical fault on internal overhead power lines that results in a coal fire on coal covered by approx 1m overburden on a horizontal coal surface.	Mobile equipment breakdown that requires hot work to rectify, OR Machinery fire from oil on hot engine parts, inadequate machine maintenance or housekeeping, fault condition OR Non compliance with Anglesea's non smoking policy within the mine area and disposal of a still lit cigarette or butt OR East and West 3.3kV overhead lines electrical fault. This is NOT A CREDIBLE EVENT given that all horizontal coal surfaces will be covered. Not assessed further.	Strategy to ensure all horizontal coal surfaces covered by approx 1m OB by 31/8 (including haul roads, any loose fines), preventing hot work, machinery fire, cigarette, or electrical fault contact with coal surface.	N/A	N/A	N/A													Adequate	As per risk item 1.1 above		
4	Coal Fire as a result of Deliberately Directly lit fire, Direct Lightning Strike	1.00	Deliberate action to directly ignite exposed coal OR Lightning Strike to coal on the west wall (approx 850m long by 5 - 10m high) resulting in coal fire. NOTE: sections of this area exposed for up to 28 years without any events including Ash Wednesday.	Deliberate intentional act OR Act of god (weather conditions permitting), storm, lightning storm with or without rain	Steeply angled slope, minimal fines build up due to age, Ongoing 24/7 site security to deter / detect unauthorised access.	Detection expected via progression through phases of steamy, smoky and then fire gives time to detect and respond, Observation by onsite resources, daily inspection regime from onsite resources to be established	West wall area physically difficult to access without machinery, and steeply angled	Procedures and SWI's to be in place, Onsite Alcoa supervisory resources to be in place, Equipment to be retained, Resources to operate to be established.	1	1	1	2	1	E	Low	Low	Low	Low	Low	Adequate	As per risk item 2.2 above			
5	Fire within any area of the plant site including the fenced area and disturbed mine area	1.00	Fire within any area of the plant site not directly related to coal within the mine	External bush fire ember attack, Hot Work activity, Machinery fire, Smoking, Overhead line electrical fault, Deliberately lit, Lightening,	Ongoing 24/7 site security and Alcoa supervisory resources, hot work procedures, Machinery maintenance and operation procedures, non smoking policy, Electrical protection in place, Maint PM line inspections (check freq), vegetation management under lines, Bushfire Mitigation Plan and Line Clearance Audits, Vegetation management for fire breaks and electrical lines	Notification from external parties in advance of bushfire (DELWP, Parks, CFA), Ongoing 24/7 security, onsite Alcoa supervisory resources both to identify and trigger appropriate response plan including response with local authorities. Operators in attendance at hot work/machinery, Electrical system protection monitoring	N/A	Procedures and SWI's to be in place, Onsite Alcoa supervisory resources to be in place, Equipment to be retained, Resources to operate to be established. Including response plan to be reviewed / developed with local CFA and security.	1	1	1	2	1	D	Low	Low	Low	Low	Low	Adequate	Ensure review/update of the following procedures includes review wrt fire in any area within the plant site: Ang Emergency Plan, Review/update CFA PIP, Review/update OPG024 for bushfires...particularly for appropriate response from August 31. Review with CFA. Ensure ongoing community engagement and communicate actual risks, Ensure appropriate equipment retained from 31/8, Ensure resourcing for operation of retained equipment. Review external notification process DELWP/Parks/CFA others established. Review vegetation management practices, review electrical protection monitoring regime/notification process	BH	31-Aug	
6	Fire associated with future remediation work	1.00	Fire associated with any aspect of future remediation work	To be developed with the Alcoa Asset Planning and Management Group in advance of site/mine remediation activities commencing.	Expected to be as above PLUS any items identified out of review with APM Group	Expected to be as above PLUS any items identified out of review with APM Group	Expected to be as above PLUS any items identified out of review with APM Group	Expected to be as above PLUS any items identified out of review with APM Group	1	1	1	2	1	D	Low	Low	Low	Low	Low	Adequate	Expected to be as per risk item 5.1 above PLUS any items identified out of review with APM Group. Note: future risk expected to be low with anticipated controls expected to be adequate, but to be assessed at appropriate time in the future.	WS	TBD	

Risk Assessment																									
Elt ID	Key Element	Ref	Event/Aspect	Cause	Existing Controls				Consequences						Probability Rating	Risk Rating						Adequacy of Controls	Risk Treatment Plans	Person Responsible	Action Date
					Prevention Designed to prevent event occurring	Detection How do you know an event has occurred	Protection Automatic	Mitigation Requires people intervention	Impact areas							Impact Areas									
										Health And safety	Envi/ro	Regula	Image	Financ			Health	Envi/ro	Regula	Image	Financ				

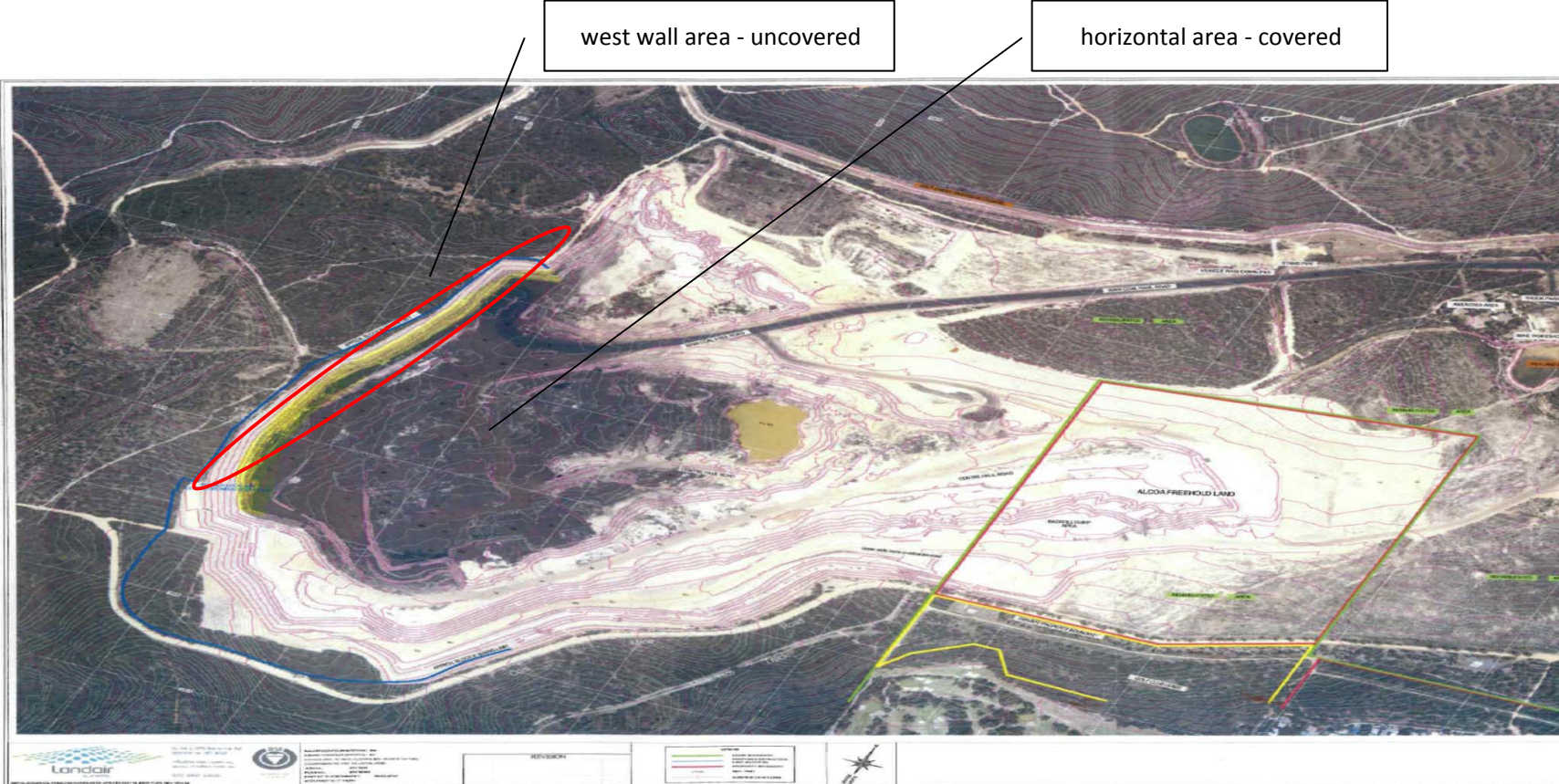
Risk Criteria

Rating	Consequences								Probability of Event				
									Rare	Unlikely	Possible	Likely	Almost Certain
									E	D	C	B	A
	Health & Safety	Environment	Regulatory	Image and Reputation	Financial Impacts	Facility Integrity	Project Performance	Employees	Very unlikely to occur	Not impossible, more likely not to occur than to occur.	As likely to occur as not to occur.	More likely to occur than not to occur.	Expected to occur
								Probability less than 0.04	Probability 0.04 - 0.1	Probability 0.1 - 0.5	Probability 0.5 - 0.8	Probability over 0.8	
								No experience of this occurring in the broader worldwide industry but is theoretically possible	A similar outcome has arisen at some time previously in Alcoa operations worldwide or broader industry	A similar outcome has arisen at some time previously in local operations	A similar outcome has arisen several times per year in Alcoa operations worldwide or broader industry	A similar outcome has arisen several times per year in the local operations	
5 Catastrophic	Single fatality of staff, contractor or the public	Long term environmental damage (5 years or longer), requiring >\$5M to study or correct or in penalties	Regulatory intervention and prosecution possible	Damage to corporate reputation at international level; raised in international media; major loss of political, shareholder or community support	Direct loss or increased cost >\$20M; estimating error or capital loss >\$20M; fraud > \$1M	Major unacceptable system, asset, integrity or condition problem Failure to achieve critical system, asset or performance goals	Time-critical project misses major milestone or deadline > 6 months Failure to achieve critical system, asset or performance goals	A large number of senior managers or experienced employees leave the company					
4 Major	Serious injury or occupational illness (non-recoverable) or permanent major disabilities (acute or chronic)	Medium-term (1-5 yr) environmental damage, requiring \$1-5M to study or correct	Breach of licenses, legislation, regulation or corporate-mandated standards	Damage to corporate reputation at national level; raised in national media; significant decrease in political, shareholder or community support	Direct loss or increased cost of \$5-20M; estimating error or capital loss of \$5-20M; fraud \$0.5-1M	Failure to achieve some system, asset, integrity or condition targets Failure to achieve some performance targets	Time-critical project misses major milestone or deadline by 3-6 months Failure to achieve some performance targets	Some senior managers or experienced employees leave High turnover of experienced employees Company not perceived as an employer of choice					
3 Moderate	Loss time or restricted injury or occupational illness (recoverable)	Short-term (<1 yr) environmental damage, requiring up to \$1M to correct	Breach of standards, guidelines or impending legislation, or subject raised as a corporate concern through audit findings or voluntary agreements	Adverse news in state or regional media; decrease in political, shareholder or community support	Direct loss or increased cost of \$1-5M; estimating error or capital loss of \$1-5M; fraud \$0.25-0.5M	Some reduction in system, asset, integrity or condition Some reduction in performance	Time-critical project misses major milestone or deadline by 1-3 months Some reduction in performance	Poor reputation as an employer Widespread employee attitude problems High employee turnover					
2 Minor	Medical treatment or first aid injury; no lost time or occupational illness	Environmental damage, requiring up to \$0.25M to study or correct	Breach of internal procedures or guidelines	Adverse news in local media; concerns on performance raised by shareholders, government or the community	Direct loss or increased cost of \$0.25-1M; estimating error or capital loss of \$0.25-1M; fraud \$0.1-0.25M	Minor system, asset, integrity or condition degradation Minor performance degradation	Time-critical project misses major milestone or deadline by <1 month Minor performance degradation	General employee morale and attitude problems Increase in employee turnover					
1 Insignificant	No injury or occupational illness.	Negligible environmental impact, managed within operating budgets	No breach of licenses, standards, guidelines or related audit findings	Reference to community consultation group; public awareness may exist, but there is no public concern	Direct loss or increased cost below \$250,000 Negligible estimating error or capital loss Negligible fraud	Negligible system, asset, integrity or condition impact Negligible performance impact	Negligible milestone or deadline delay Negligible performance impact	Negligible or isolated employee dissatisfaction					

Risk Level:-	
Extreme	Action plans must have single point accountability at top or executive management level
High	Action plans must have single point accountability at senior or location management level
Medium	Action plans must have Single Point Accountability at Operating Centre or project management level
Low	No action plan required

Bob Barry Witness Statement - Attachment J.xls

<u>Risk Matrix -Qualitative</u>		Probability				
Consequence		Rare E	Unlikely D	Possible C	Likely B	Almost Certain A
5	Catastrophic	Medium	Medium	High	Extreme	Extreme
4	Major	Low	Medium	High	High	Extreme
3	Moderate	Low	Medium	Medium	High	High
2	Minor	Low	Low	Medium	Medium	Medium
1	Insignificant	Low	Low	Low	Low	Medium
<u>Risk Matrix - Semi Quantitative</u>		Probability				
Consequence		Rare E	Unlikely D	Possible C	Likely B	Almost Certain A
5	Catastrophic	5	10	15	20	25
4	Major	4	8	12	16	20
3	Moderate	3	6	9	12	15
2	Minor	2	4	6	8	10
1	Insignificant	1	2	3	4	5





SCALE	
0	50 100 150 200
METRES	
SCALE	GRAPHIC SCALE
1:5000	N/A

ALCOA
ANGLESEA
VIC 2015