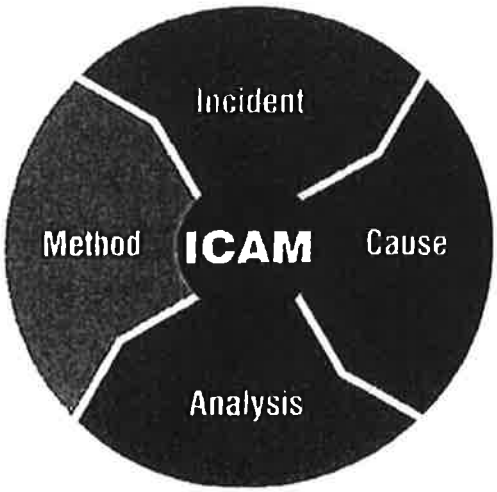
Health and Safety

ICAM INVESTIGATION REPORT

205RL Dump slumped while rear dump truck was tipping



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ICAM INVESTIGATION

1. Lead Investigator

Name	Position	Site
	Senior Safety, Health & Trainina Advisor	

2. Investigation Team Members

Name	Position	Site
	Production Superintendent	
	HSE Superintendent	
	Proiect Geoloaist	
	Trainer Assessor	
	Production leadina hand	
	Production Ooerator	
	Open Cut Examiner	

3. Investigation Commenced: 13/02/2015

4. Incident Details

Incident

Location:	205RL Dume West
Time:	04:28am
Date :	

Details of Damage / Impact

Damage to plant/equipment :	Nil dama e
Environmental im act :	Nil Environmental Im act

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Actual conseauence classification:	Class 3
Potential consequence classification:	Class 2

Cintellate Incident Number	

5. Incident Description

Throughout night shift, on the 30th - 31st of January CAT 789 rear dump trucks were hauling free dig overburden material from MP Strip 17 to the 205RL Dump on the North West side of Main Pit.

Towards the end of shift at approximately 04:20am, Dump truck 01 entered the 205RL dump and proceeded to dump at the tip head. As dump truck 01 was lowering the rear tray after tipping the payload, the dump began to slump approximately 4 meters from the tip face and caused the rear of the dump truck to sink down with the slumping and rest on the undercarriage.

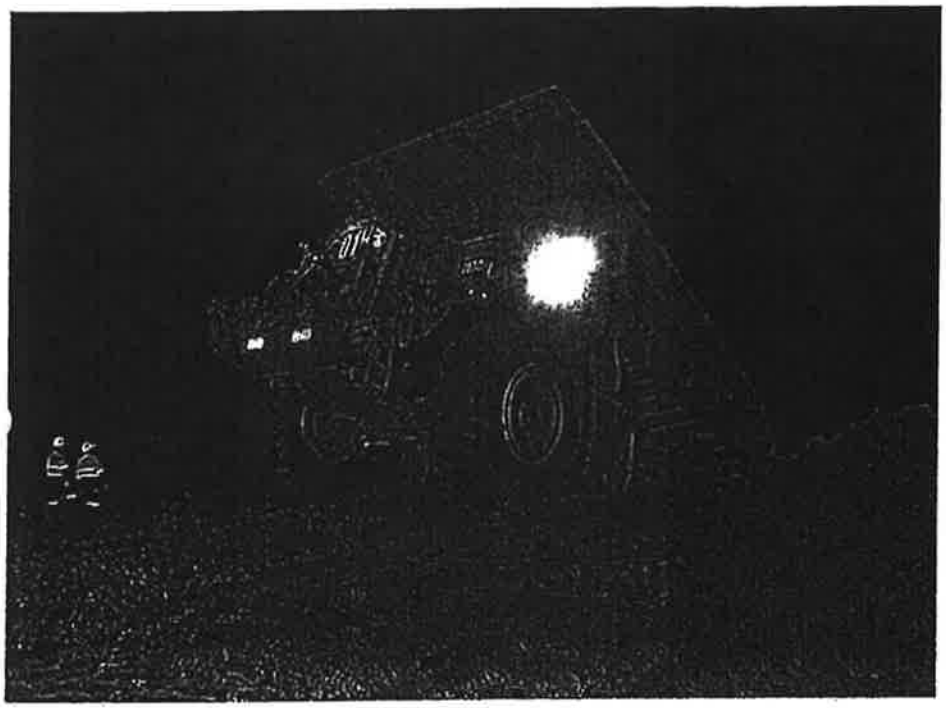
Additional Information

- Excavator 32 circuit comprising 6 x CAT 789 rear dump trucks hauling from MP strip 17 to 205RL dump. CAT D11 dozer constructing 205RL dump at 25 metres in height.
- The material excavated and hauled to the 205RL dump was observed to be a damp sandy clay material.
- The dump Dozer had observed some minor slumping of the 205 RL dump earlier in the shift, as a precaution the bund size was increased and the rear dump trucks were tipping well short of the bund.
- Really wet material was being sent to the 150RL Dump.
- In the two weeks leading up to the incident, 206mm of rainfall was recorded at *(source - eldersweather.com.au)*
- 205RL Dump inspection conducted by the OCE (Open Cut Examiner) on 29/01/2015 indicated Amber conditions as per the Geotechnical Principal Hazard Management Plan Trigger Action Response Plan (PHMP TARP).
- OCE Report indicates 205RL slumping and communicated to mine workers.
- The last recorded rainfall prior to the incident was 17.6mm recorded up to 9am *(source - eldersweather.com.au)*
- Following the incident, the project geologist examined the dump material and determined that the material used for the 205 RL dump was an medium to fine grained alluvium sand with a clay matrix. Small to medium clasts of igneous material were also visible. The material was noticeably water logged after recent rain events.

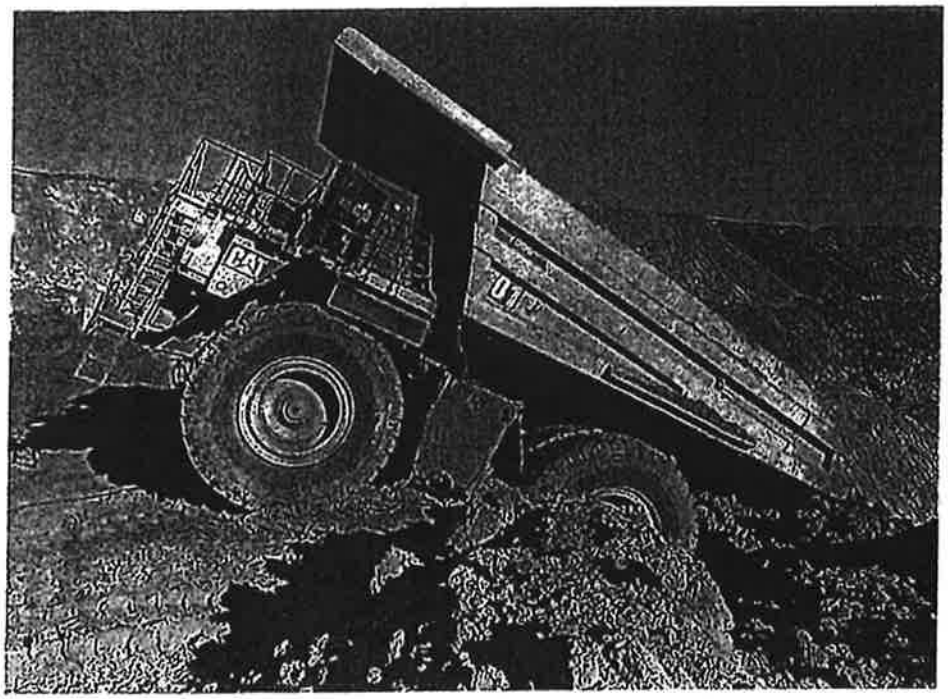
6. Immediate Action Taken

- An Emergency was called by the dump dozer operator
- Dump dozer operator positioned dozer 26 next to Truck 01 so as to provide a step for the truck operator to access the ground
- The operator of Truck 01 safely exited the cab to ground level
- Dumping on 205RL discontinued and Truck 01 recovered

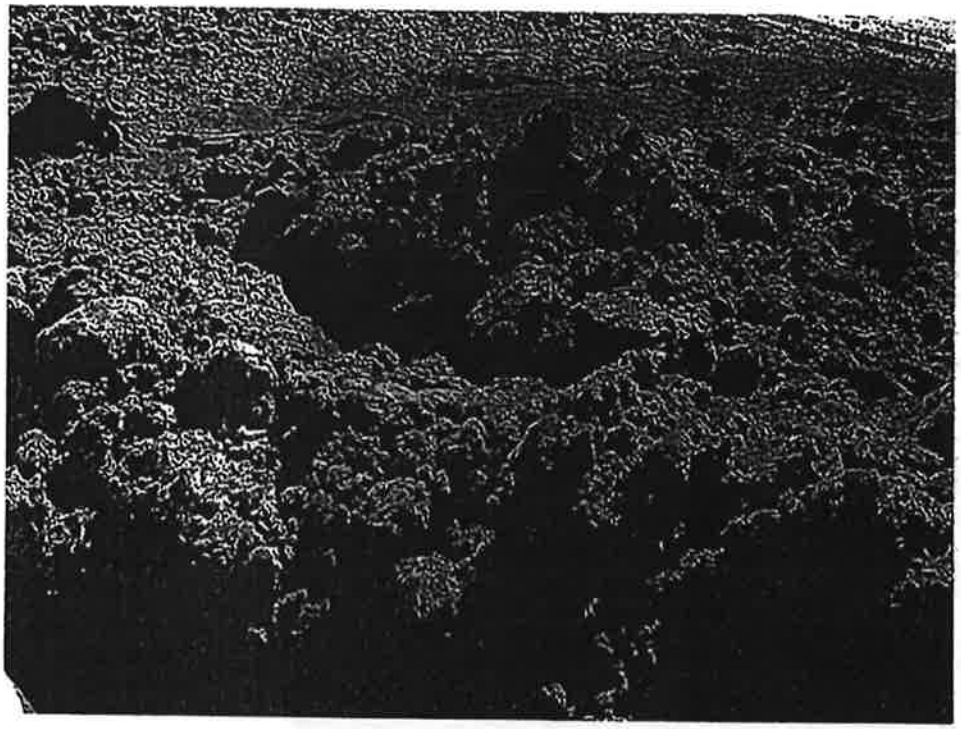
7. Diagrams and Photos



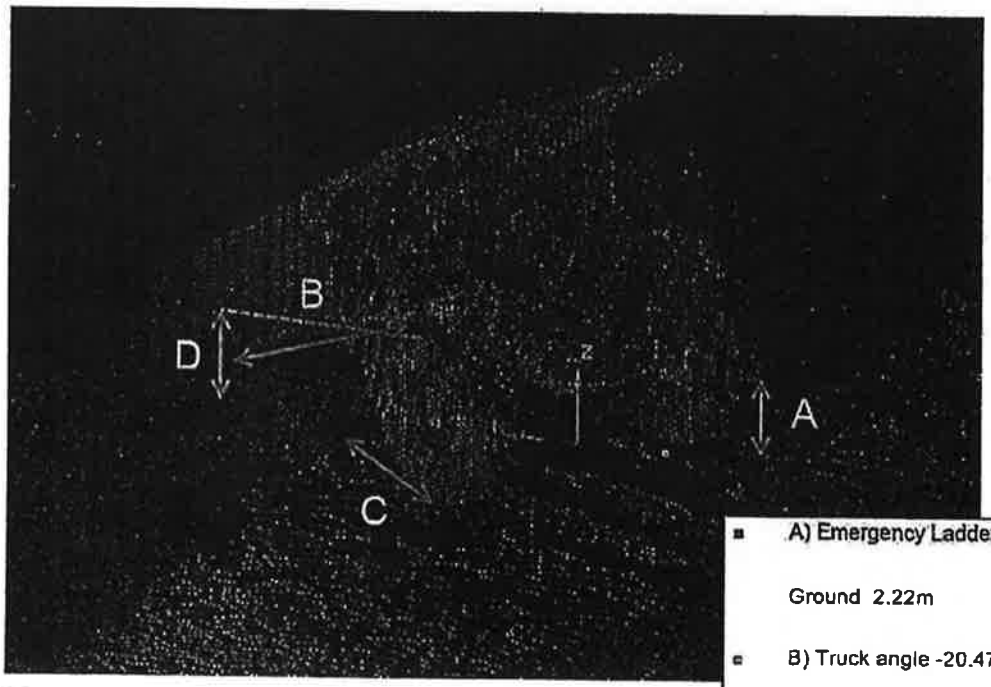
Picture 1 - Truck 01 final resting position on 205RL Dump



Picture 2 - Day light and recovery phase of Truck 01

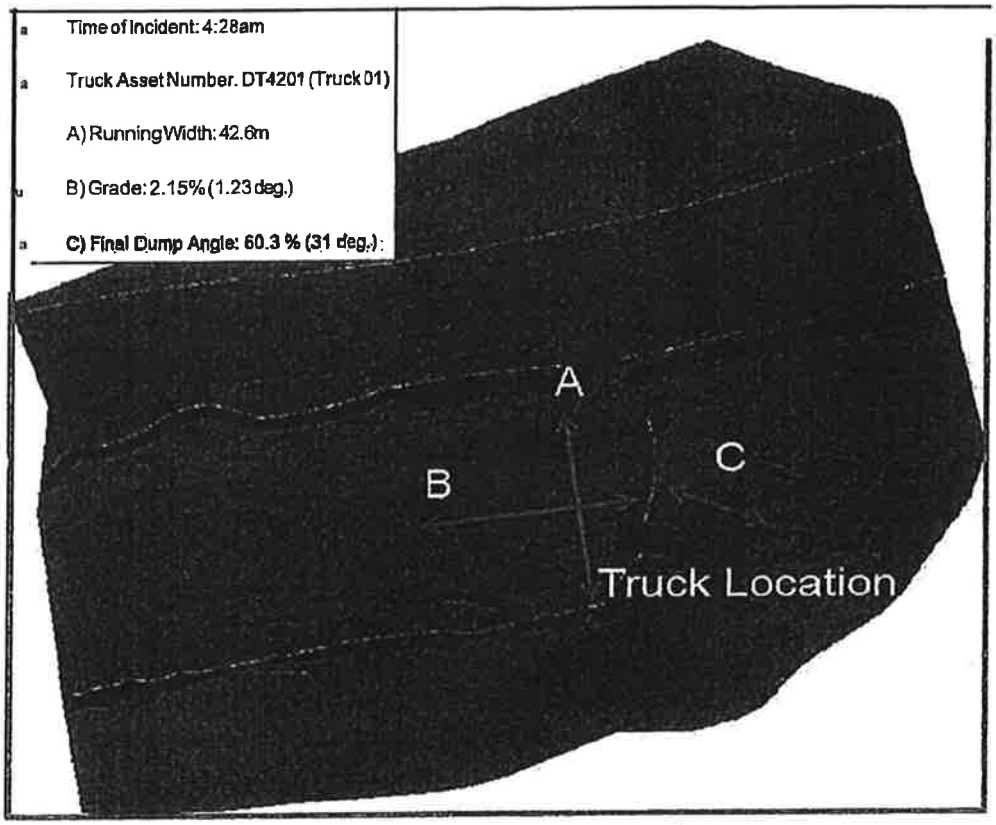


Picture 3 - water logged alluvium sand with a clay matrix

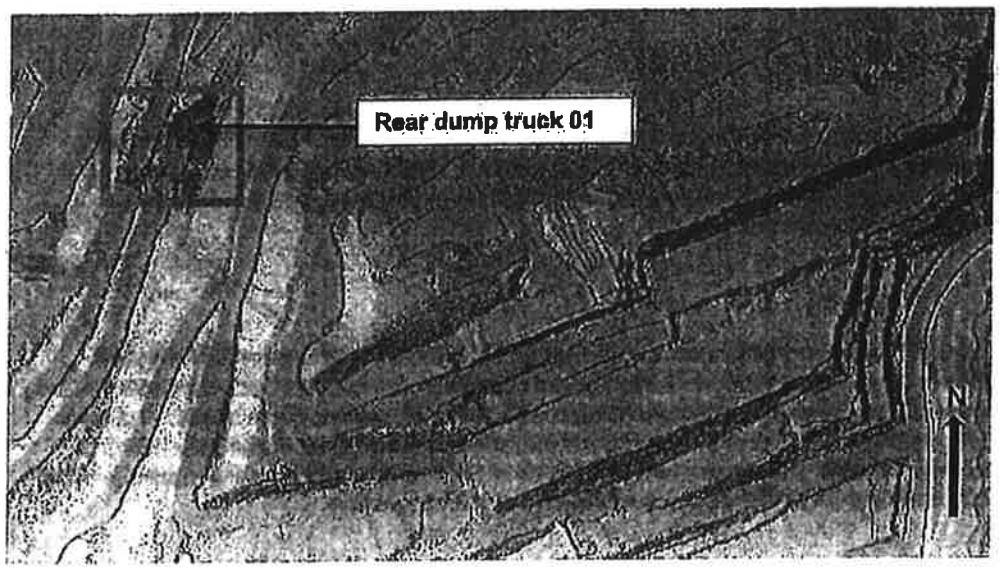


- A) Emergency Ladder Height from Ground 2.22m
- B) Truck angle -20.47 deg.
- C) Distance from Sund 3.8m
- D) Vertical displacement of tyre 2.32m

Picture 4 - Survey pick ups



Picture 4 - 3D Overview of Dump



Picture 5 - Location in Pit

Investigation Process

The Incident Cause Analysis Method (ICAM) was employed to examine the events surrounding the incident and to determine the possible cause in order to identify recommended actions to prevent a recurrence.

8. Key Findings

Basic Causes -

The investigation team has determined that the basic cause of the incident was incompetent material being used to construct a waste dump 25 metres in height.

Main Contributing Factors

Absent /failed defences

DF13 - Hazard awareness - Production crews were aware of the wet material and used caution during the 205RL dump construction. Bunds were extended in height, trucks were dumping short and dump floor was constantly monitored, however; the wet material was not suitable for the height of the dump and this was not taken into consideration.

Task/Environmental Conditions

TE 7 - Materials suitability - Water logged material was too wet and unsuitable for the dump height.

TE 14 - **Lighting** - Unable to monitor slumping of the dump face at night due to no visibility.

Organisational factors

RM - Risk Management - *Operational Geotechnical Inspection - Dump I Stockpile* conducted on the 29/01/15 by the OGE identified Amber Geotechnical TARP conditions. There was no follow up of a *Detailed Operational Geotechnica/ Checklist- Overburden & Coal Dump* to investigate the Amber conditions further and the material properties.

Key Learning's

The management of the 205RL dump construction leading up to the incident was conducted with vigilance by the production crews. Experience in hauling and dumping of the overburden material from Sonoma Pit in the past has allowed dumps to be constructed with minimal geotechnical faults. The rain events leading up to this incident indicate that the overburden material contains properties that are susceptible to large amounts of water, therefore the retention of excess water indicates the material is not suitable for constructing dumps at heights of approximately 15 metres or greater.

9. Action Plan

Contributing Factor i.e. Absent/ Failed Defences	Recommended Action	HOC	Responsibility / Assigned to	Due date
DF13 - Hazard awareness - Production crews were aware of the wet material and used caution during the 205RL dump construction . Bunds were extended in height, trucks were dumping short and dump floor was constant ly monitored, however; the wet material was not [illegible] able for the height of the dump and this was not taken into consideration.	Risk assessment to be conducted for constructing dumps with wet material. Include in Geotechnical TARP.	Administration		
	Dump heights not to exceed 15 metres when constructing with wet free dig material. Review inspections and include dump height restrictions for bulk wet material in Geotechnical TARP.	Administration	(geos)	
RM - Risk Management - *Operational Geotechnical Inspection - Dump I Stockpile* conducted on the 29/01/15 by the OGE identified Amber Geotechnical TARP conditions. There was no follow up of a *Detailed Operational Geotechnical Checklist - Overburden & Coal Dump* to investigate the Amber conditions further and the material properties .	Where Amber is identified in the Operational Geotechnical inspection, a follow up detailed operational geotechnical inspection is to be conducted. Communicate memo to OCE's and Geoloaists	Administration		
	Operational Geotechnical Inspections to be reviewed and signed off on the day of inspections. Memo to Production and Tech services Superintendent.	Administration		

10. Appendices

- 10.1 PEEPO Chart
- 10.2 Incident Alert
- 10.3 Safety Essentials Audit
- 10.4 Events leading up to the incident
  - 10.4.1. Timeline
  - 10.4.2. Incident tree and 5 whys
  - 10.4.3. ICAM Factor Chart
- 10.5 Documentation References
  - 10.5.1. Interview Statements
  - 10.5.2. Training Documents
  - 10.5.3. Maintenance Records
  - 10.5.4. Risk Assessment (i.e. JSEA / Take 5)
  - 10.5.5. Photographs (additional)

10.1 PEEPO Chart

Add to the table as needed- NOTE: Information gathered in this chart need to be included in the Appendix under Documents/Records

Type	Guide	Response
PEOPLE	• Identify the relevant people directly or indirectly involved with the incident	• Truck 01 operator - Out of cab and on the ground before ERT arrive • 205RL Dump Dozer operator - Did a good job maintaining dump with wet material, positioned dozer near truck 01 to allow Tracey to alight from truck • Open Cut Examiner - ER Coordinator received emergency call directly after handover. • C Crew production supervisor - coordinated stoppage • C Crew production 2IC - assisted picking up ERT members • (railway Crib Hut) orkshop) picks up ERT trailer
	• Statements from involved person or witnesses	• 1 - Dump Dozer
	• Subject matter experts to establish: • correct method of work • workings of the plant and/or equipment • other technical knowledge that relevance	• Hitachi 5500- EX32 removing MP Strip 17 overburden, loading 6 x CAT 789 dump trucks hauling overburden to 205RL Dump. • Dozer 26 constructing 205RL Dump • Building oversize bunds and dumping short due to minor slumping and damp material has • MP Strip 17 - Medium to fine grained alluvium sand with a clay matrix. Small to medium clasts of igneous material were also visible. The material was noticeably water logged after recent rain events. • 2 x Lighting plants illuminating 205RL dump
	• Task being conducted	• Load, Haul and dump
	• Relevant training and competency records for person(s) involved.	• Persons involved have been trained as per LCPL training and competencies, and are authorised by SSE to operate specified machinery
	• Physical/emotional/mental capabilities of involved person(s)	• Operator of truck 01 remained calm and composed, continued operating until end of roster (2 x nights)

ENVIRONMENT	• Location of incident	• 205RL dump north west end of pit
	• Conditions i.e. Lighting, visibility, weather conditions, dust	• Night time • Clear night • Pit conditions wet from rain periods
	• Congested / restricted work area	• Dump constructed to plan
	• Tasks performed in the vicinity	• Dozer and dump activities
	• Noise	• NA
EQUIPMENT	• Correct equipment/tools used	• Authorised machinery
	• Equipment/tools in good condition	• Machinery regularly maintained
	• Any modifications	**NA**
	• Safety guards/railings etc. in place	**NA**
PROCEDURES	• Work instructions / procedures for task	• Load haul and dump
	• Inspection records	• 205RL dump inspection On 29/01/15 Amber. No detailed inspection conducted following Amber observation.
	• Maintenance Records	**NA**
	• Risk assessment tool (JSEA/Take 5)	• No risk assessments for 205RL dump
	• Equipment and calibration register	**NA**
	• Change Management document	**NA**
	• MSDS	**NA**
ORGANISATION	• Quality of training methods / training material	• Approved RII Machine operations • Authorised trainer assessors
	• Reviews conducted on procedures	• As per SOP, SWI review schedule
	• Visible leadership/supervision	• In field supervision and 2IC support
	• Communication/consultation with personnel	• Pre-starts, Toolbox talks, notice boards and site communication

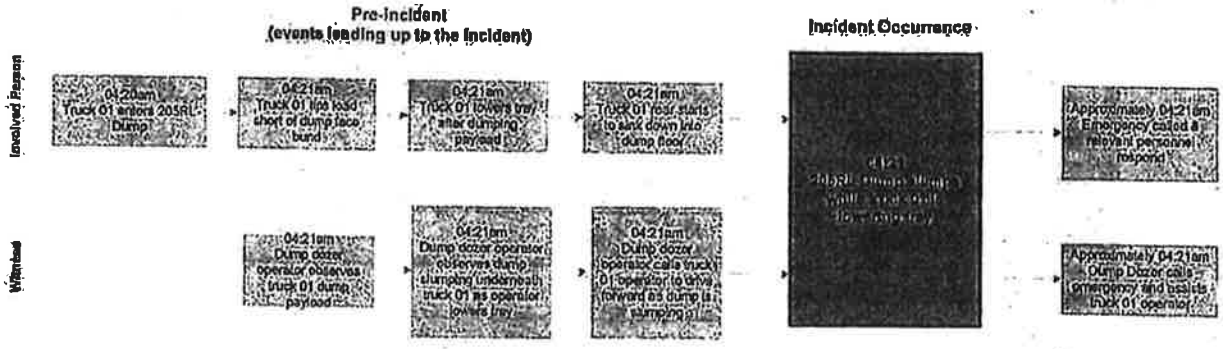
10.2 Audit of incident against

Example Table

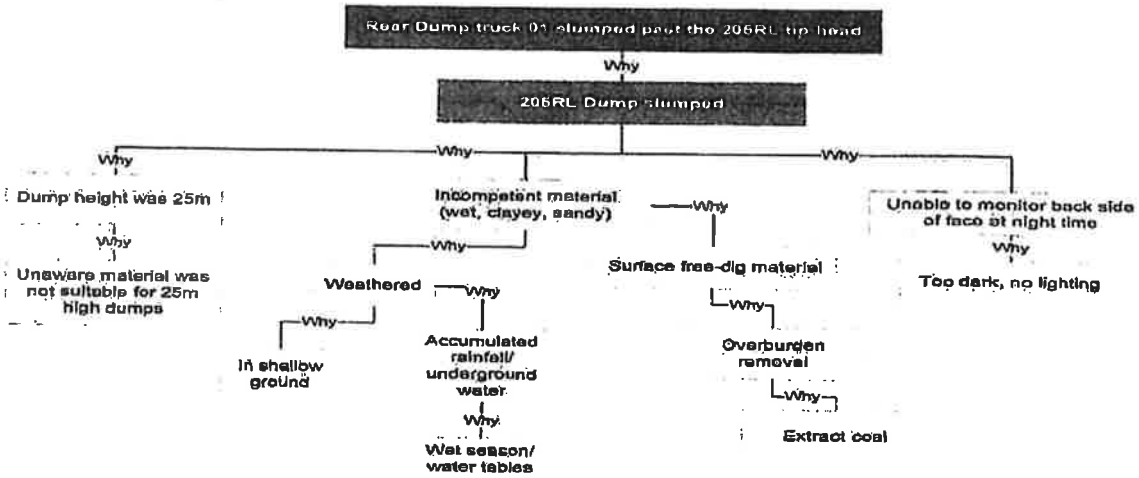
	Applicable Y/N Audit Incident
E001 – Confined Spaces	N/A
E002 – Cranes and Lifting Operations	N/A
E003 – Electrical Safety	N/A
E004 – Explosives and Blasting	N/A
E005 – Ground Control	Y - Geotechnical PHMP - Dump Inspections
E006 – Mine Traffic and Roadways	N/A
E007 – Mining Operations	N/A
E008 – Mobile Assets	N/A
E009 – Plant Safeguarding and Isolation of Energy	N/A
E010 – Tyres	N/A
E011 – Working at Heights	N/A

Events leading up to the incident

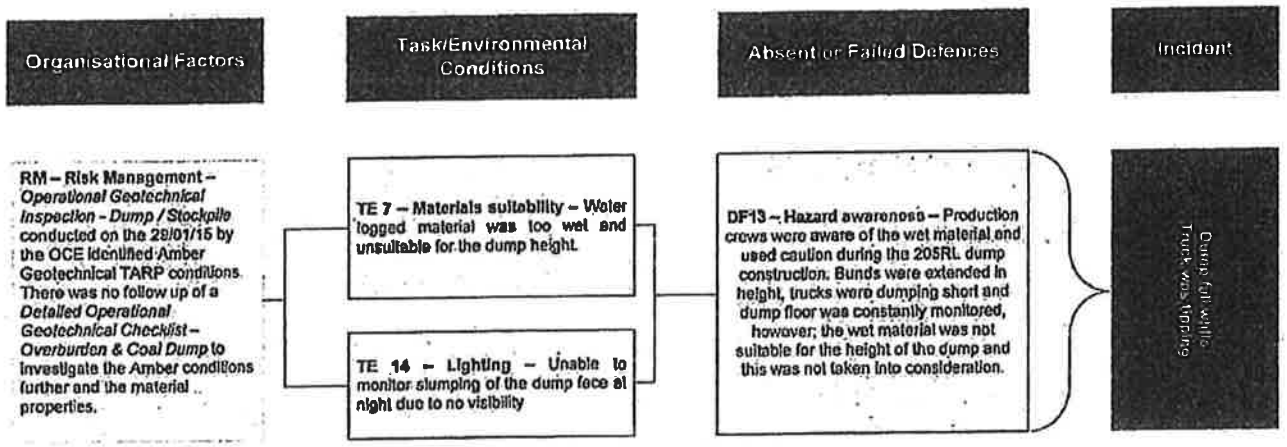
10.4.1. Time Line



10.4.2. Incident Tree & 5 Whys



10.4.3. ICAM Chart



10.3 Documents / Records

10.5.1. Interview Statements

The following statements of interview are attached:

Dump Dozer operator -

Incident Witness/ Involved Persons Statement

INCIDENT DETAILS

Incident: .. Incident No: _____

Project: _____ Interview Date: _____

WITNESS / INVOLVED PERSONS DETAILS

Name: _____ Position: OPERATOR

Department: PRODUCTION Company: _____

Shift / Crew: N/S C CREW Supervisor: _____

Contact Details: _____ D.O.B: _____

STATEMENT

Please fully describe the work and conditions in progress leading up to the incident:

AT APPROX. 4:20AM TRUCK 01 HAD TIPPED HER LOAD ON THE 205 RL DUMP WHEN THE TIPHEAD SLUMPED AWAY ROUGHLY 4 METRES IN FROM THE DUMPFACE. I CALLED THE DRIVER AND TOLD HER TO DRIVE AWAY AS SOON AS I SAW WHAT WAS OCCURRING. THE REAR OF THE TRUCK SUNK DOWN WITH THE TIPHEAD MATERIAL AND RESTED ON THE UNDERCARRIAGE. I CALLED AND EMERGENCY AS THIS WAS HAPPENING.

Please summarise the incident sequence from start to finish

Time	Event	Time	Event
4:20AM	TRUCK 01 TIPPED LOAD ON 205 RL DUMP	4:2-	TRUCK 01 SINKS DOWN & I CALLED AN EMERGENCY
4:2-	DUMP BEGINS TO SLUMP AS SHE LOWERED HER TRAY	4:2-	I POSITIONED DOZER 26 SO AS TO PROVIDE A STEP FOR THE DRIVER TO EXIT TRUCK 01

Note anything unusual you observed prior to or during the incident (sights, sounds, smells, etc):

THERE HAD BEEN MINOR SLUMPING EARLIER IN THE SHIFT WHEN THE DOZER WAS BEING HOT SEATED. MATERIAL THAT WAS BEING HAULED AND DUMPED WAS DAMP CLAY & WET MATERIAL WAS BEING SENT TO ANOTHER DUMP

What was your role in the incident sequence?

I WAS OPERATING THE DUMP DOZER AND WITNESSED THE INCIDENT

What conditions influenced the incident (weather, time of day, equipment malfunctions, etc)?

THE MATERIAL BEING TIPPED ON THE DUMP FAILED TO SUPPORT THE WEIGHT OF A 789, THE DUMP SLUMPED 4 METRES IN FROM THE TIPHEAD - IN FRONT OF THE REAR TYRES.

How did people influence the incident (actions, emergency response, etc)?

MY EMERGENCY CALL WAS ANSWERED PROMPTLY BY THE OCE & ERT ARRIVED VERY SOON AFTER THE CALL. THE OPERATOR OF TRUCK 01 HAD NO CONTROL OVER THE EVENTS AND RESPONDED VERY PROFESSIONALLY.

What do you think caused the incident?

UNSUITABLE MATERIAL FOR A 25M HIGH DUMP. THE FACT THAT THE DUMP GAVE WAY IN FRONT OF THE 789'S REAR TYRES WAS UNEXPECTED & PREVENTED THE TRUCK FROM DRIVING AWAY IN TIME.

How do you think the incident could have been prevented?

PADDOCK DUMPING OR A LOWER DUMP HEIGHT FOR DAMP CLAY/SAND MATERIALS

Please list other possible witnesses:

OTHER TRUCK DRIVERS ON EX32 CIRCUIT

Additional comments/observations:

AS A PRECAUTION DUE TO THE MINOR SLUMPING EARLIER IN THE SHIFT WE WERE ALREADY BUILDING OVERSIZED BUNDING AND THE TRUCKS WERE TIPPING WELL SHORT OF THE TIPHEAD. THE DISTANCE FROM THE TIPHEAD WHERE THE FAILURE OCCURED WAS UNEXPECTED

I declare that the above statement is true and accurate

Witness Name: _____ Date: _____

Signature: _____

10.5.2. 205RL Dump Inspection

Operational Geotechnical Inspection
Dump / Stockpile
(OVERBURDEN/REJECTS DUMP, COAL STOCKPILE)

Inspection By - Name:		**Occupation:** OCE	
Location: RL205 DUMP (Red Dirt)			
Condition	**EXISTING CONDITIONS** (Tick ☑ one in each row)		
	GREEN Normal Operation ☑	**AMBER** Access *Partially* Restricted ☑	**RED** Access [illegible] [illegible] ☑
Cracking	Minor settling cracks ☐	Significant cracks developing at dump crest ☑	Imminent failure of dump indicated by rapid opening of cracks, floor heave, bulging toe, constant movement of spoil material ☐
Dump Floor	Competent/conditioned dump floor free from mud or slippery material ☐	Dump floor may not support long-term dumping practices ☑	Dump floor is unsuitable for the storage of large masses of material for the medium to long term ☐
Windrows	Windrow to design standard ☐	Sections of windrows showing signs of slumping ☑	Sections of dump windrows are absent due to slumping ☐
Material	Dry and homogeneous material being dumped ☐	Occasional dumping of weak and incompetent material (wet, muddy material) Oxidised coal/high sulphur coals ☑	Old stock pile; continual dumping of weak and incompetent material (wet, muddy material) ☐
Ground Water Outflow	No evidence of water outflow from toe of dump ☑	Increased water seepage from dump toe and/or increased water discolouration ☐	Muddy water flowing freely from dump toe ☐
Dump Height / Coal Stockpile	Short-life stockpiles; <30m height between berms ☑	Slope >30m high; reclaim-tipping on same stockpile ☐	Spontaneous combustion visible; sheared face; undercut reclaim face ☐
Dump Toe	No evidence of bulging in dump toe ☑	Bulging dump toe ☐	Imminent failure of dump toe due to excessive bulging ☐
TARP Condition [illegible]			
TARP CONDITION (Tick ☑ one)	**GREEN** Normal Operation ☑	**AMBER** Access *Partially* Restricted ☑	**RED** Access Highly Restricted ☑

Inspection By: (Print Name)			
Inspection By: (Signature)		Date:	Time: 9:00 am / pm
Tech Services Superintendent Review: (Print Name)			
Signature:		Date	

11. ICAM Report Checklist

This checklist must be completed prior to the report being signed off

Tick if completed ✓	
☐	Ensure the Lead Investigator/Facilitator is identified in the report
☐	Check that the incident description would be understood by an external auditor
☐	Ensure the basic cause identified is not a description of what happened – it should be a simple statement
☐	Contributing Factors (Absent or Failed Defences, Individual/Team Action, Task/Environmental Conditions and Organisational Factors) should fit the code categories included in the 2010 ICAM Guide
☐	There will usually be contributing factors in each category, use the 5 Whys to identify them
☐	Each Organisational Factor and Absent/Failed Defence must be addressed in the action plan
☐	Identify which type of control (from the Hierarchy of Controls) is provided by each corrective action. Aim for "Above the Line" controls.
☐	Check the corrective actions are aimed at improving the safety of the workplace and not just focussed on individuals
☐	No corrective action should use the term "apply just culture" but should recommend counselling or disciplinary action if appropriate.
☐	Consider the attachments required for the report and include a list
☐	Ensure the ICAM team and involved persons and their managers sign-off on the report
☐	Upload the report and all relevant investigation material into Cintellate within one week of completion
☐	Prepare the Lessons Learnt detailing the findings of the investigation and the recommended controls mitigating the contributing factors
☐	Send Lessons Learnt to the Project Manager for approval and distribution to the relevant business unit and divisional personnel as per the Lessons Learnt process
☐	Update the Project Hazard Risk Register and ARM Workplace Risk Register (WPRR) to include the incident details in the "Causes", "Effects", "Rationale" and Actions entered into the "Treatment Plan"

12. Report Sign-off

Lead Investigator		
Name:	Signature:	Date:
Investigation Team Members		
Names:	Signatures:	Date:
Feedback to the Involved Person(s)		
Name:	Signature:	Date:
Department Manager/Superintendent acceptance of findings and comments		
Name:	Signature:	Date:
Project HSE Manager/Superintendent acceptance of findings and comments		
Name:	Signature:	Date:
Project Manager acceptance of findings and comments		
Name:	Signature:	Date:

THIS REPORT MUST BE UPLOADED TO CINTELLATE WITHIN ONE WEEK OF COMPLETION