EXAMINATION PAPER | CERTIFICATE OF COMPETENCE

Mechanical engineering manager of underground coal mines

August 2016

CME1 – Mechanical engineering practices applicable to underground coal mines

Instructions to candidates

Unless otherwise stated all references to Act and Regulations are to the

Work Health and Safety Act 2011

Work Health and Safety Regulation 2011

Work Health and Safety (Mines and Petroleum Sites) Act 2013

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

It is expected that candidates will present their answers in an engineering manner making full use of diagrams, tables and relevant circuits where applicable and showing full workings in calculations. Credit marks will be given for such work in assessing marks for these questions. Neatness in diagrams and hand writing is essential and will be considered in the allocation of marks.

Provide answers in point form wherever appropriate. If you are unable to fit your answers in the available space, you may use the space on the opposing page. Three (3) blank pages have also been included at the end of the paper. Ensure the question you are answering is clearly marked.

Electronic aids may not be used, apart from a non-programmable calculator.

All questions are of equal value, but parts of questions may vary in value. The marks applicable to each part of a question will be indicated adjacent to the question.

Place your identification number only, NOT your name, on your paper.

10 minutes reading time is allowed prior to the start of the examination. Candidates can use a highlighter to mark points of importance during the reading time, but may not begin answering the questions.

This examination is a closed book examination.

Questions 1, 2, 3 and 4 are compulsory and candidates must attempt each of these questions.

Questions 5, 6, 7 and 8 are elective – candidates must attempt only one (1) of these questions. If more than one elective question is attempted, only the mark from one of the attempted elective questions will contribute to the candidate's total.

The questions in this section of this examination are compulsory (questions 1, 2, 3 and 4). Candidates must attempt each of these four questions.

Question 1 (Compulsory – total 60 marks)

Your company is arranging to 'dry hire' three (3) 40 tonne articulated rear dump trucks on a long term contract. The trucks are being hired from a hire company based in Queensland and the trucks have not been previously hired anywhere in NSW.

As the nominated Mechanical Engineering Manager, you have been asked to inspect the trucks for compliance in order for them to be used on site.

a) List 20 items you would be checking for as part of the site introduction requirements. (40 marks)

b) What administration systems are required to bring the trucks onto site and for their ongoing management? (20 marks)

Question 2 (Compulsory – total 60 marks)

The surface coal handling system at your mine incorporates a 4000 tonne capacity saleable coal storage bin. The bin is of concrete and steel construction and circular, with conical bottom sections feeding two (2) clam shells from the discharge outlets which load road registered trucks.

There are no alternative means of loading the saleable coal other than using the bin.

A recent structural inspection and thickness test has revealed that greater than 75% of the steel conical bottom section plates were an average of eight millimetres (8 mm) thick. Some high wear areas were as low as five millimetres (5 mm) thick. The original plate thickness was half an inch (1/2").

No records or detail drawing exist of the steel conical sections, other than general arrangement drawings. The GA drawing indicates that the steel conical bottom sections were designed for mass flow of the product.

PART 1

The mine Operator asks you the following two (2) questions.

a) What short term actions as the results of the thickness testing (if any), do you intend to take to allow the loading out process to continue and your justification? (15 marks)

b) Is the bin safe to continue loading trucks and justify? (15 marks)

PART 2

The results of analysis and investigation determined repairs will be required to the conical sections:

- A contracting company will be engaged to manufacture and install the new cone sections.
- Cutting off the worn cone section and removing it
- Welding the new cone section into position

The process will involve the use of, the following equipment:

- Lifting equipment
- Scaffolding
- Mobile elevated work platform (MEWP)
- Electric welding equipment
- Gas cutting equipment
- Electric power tools

a) List controls to be taken to ensure the work is carried out in a safe and efficient manner. (10 marks)

b) What can be done to prevent the new cone sections from deteriorating in the future? (10 marks)

c) List the activities associated with these works that would be classified as "high risk" in terms of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*. (10 marks)

Question 3 (Compulsory – total 60 marks)

The *Work Health and Safety (Mines and Petroleum Sites) Regulations*, Clause 26, Principal control plans. (4) Mechanical engineering control plan:

"The operator of a mine or petroleum site at which there is a risk to health and safety associated with the mechanical aspects of plant and structures at a mine or petroleum site:

a) must prepare and implement a mechanical engineering control plan for the mine or petroleum site that sets out the means by which the operator will manage those risks in accordance of clause 9, and"

Further to this, the mechanical engineering control plan must take into account, "the reliability of safeguards used at the mine or petroleum site to protect persons from the hazards posed by the plant or structure during each phase of its life cycle."

a) In your own words, define each of the following terms in context of mechanical engineering:
   i) Functional safety. (5 marks)
   ii) Safety critical systems (5 marks)
   iii) Safety integrity level (5 marks)
   iv) CAT levels (5 marks)

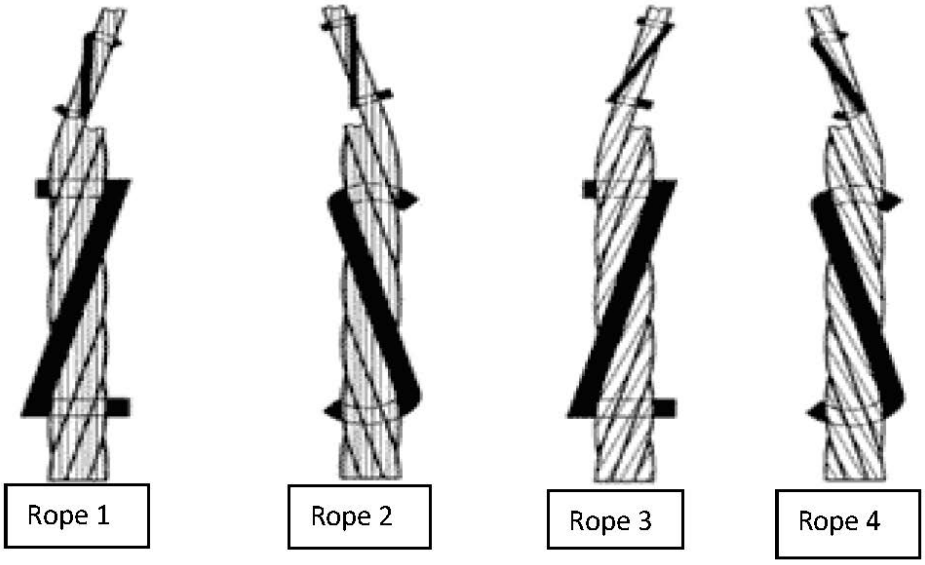
b) List the basic steps to establish functional safety requirements (20 marks)

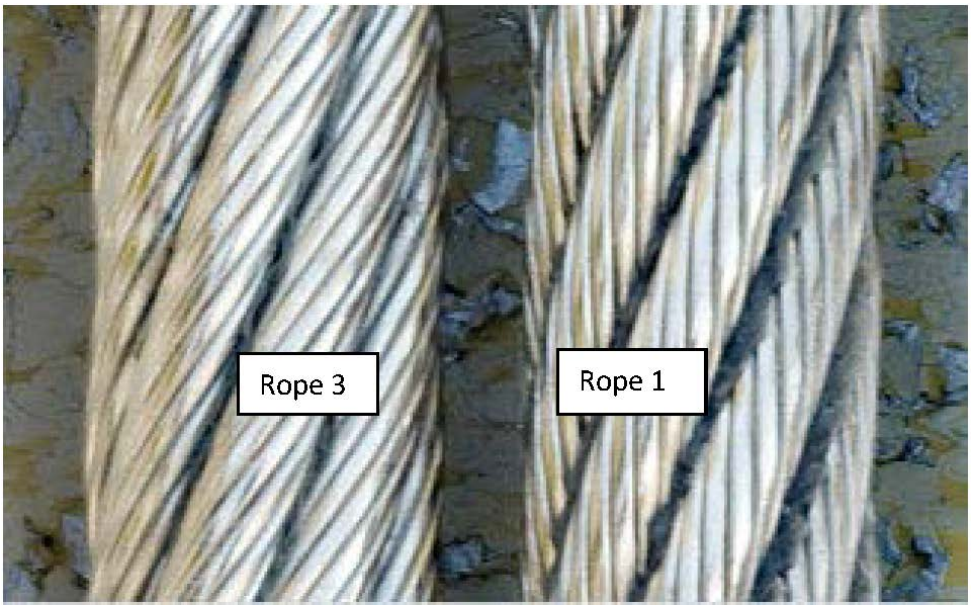
c) List the critical systems you may expect to find installed on a Reject / Refuse discharge bin and list some of the agents of failure for the critical systems that you have identified. (10 marks)

d) Describe how your inspection, testing and maintenance system would be configured to confirm the functionality of each of the critical systems identified. (10 marks)

Question 4 (Compulsory – total 60 marks)

Below are four (4) diagrams and two photographs of typical wire rope constructions used in the mining industry.



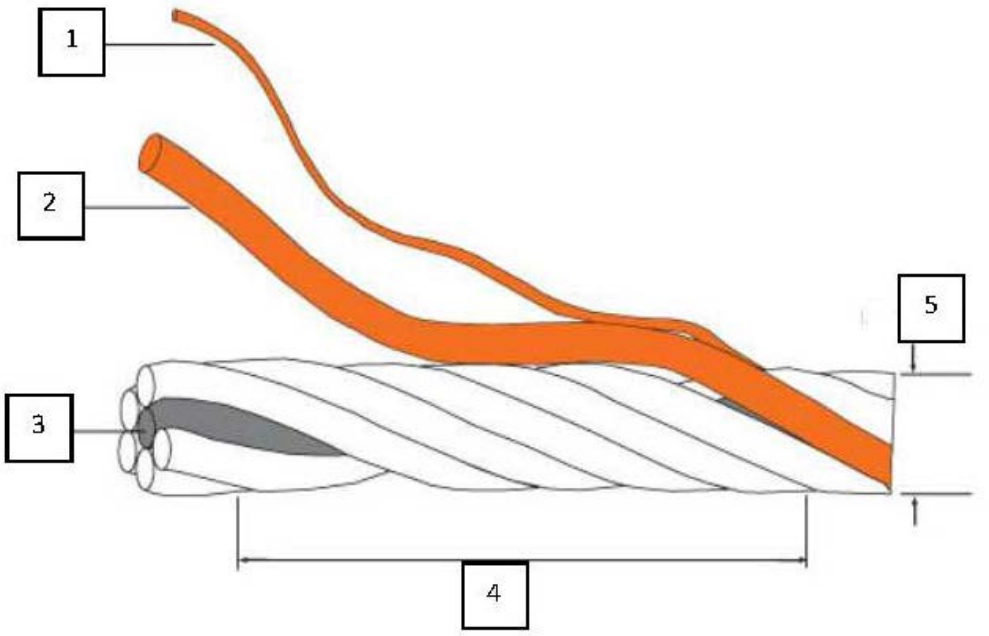


a) Provide the basic description of each of the four wire ropes.
   i) Rope 1 (1.25 marks)
   ii) Rope 2 (1.25 marks)
   iii) Rope 3 (1.25 marks)
   iv) Rope 4 (1.25 marks)

b) Describe the typical application of each lay description and why the selection for the application.
   i) Rope 1 and 2 (5 marks)
   ii) Rope 3 and 4 (5 marks)

c) Describe the major difference between the two constructions methods.
   i) Construction method rope 1 and 2 (5 marks)
   ii) Construction method rope 3 and 4 (5 marks)

d) Describe (name) the items (illustration below) 1 to 5 which contribute to the construction and description of a wire rope against the corresponding numbered lines below. (10 marks)



e) It is essential that all personnel associated with the rope capping operation are aware of the potential hazards from improper capping procedures.

The most obvious hazard that can arise is the release of a load due to failure of the rope capping which may lead to serious injury or death of anyone being conveyed through the shaft or those in the vicinity of the winding equipment.

List five (5) most common causes of premature failure of a rope capping. (25 marks).

The questions in the next section of this written examination are elective (questions 5, 6, 7 and 8). Candidates must choose only one (1) question of the four elective questions to attempt. If more than one elective question is attempted, only the mark from one of the attempted elective questions will contribute to the candidate's total.

Question 5 (Elective – total 60 marks)

Below is a table for raw exhaust gas limits for diesel engines operating in an underground environment.

a) Complete the following table below. (10 marks)

Description	**CO (ppm)**	**NO (ppm)**	**NO_2 (ppm)**	**NO_x (ppm)**
Type testing of new engines for underground coal mines without methane injection				N/A
Type testing of new engines for underground coal mines with methane injection				
In-service engines in underground coal mines		N/A		

b) What are the five (5) general health risks which should be considered when purchasing diesel powered mobile plant. (10 marks)

c) What are the maximum permitted operating grades for diesel powered vehicles fitted with water-based flametraps and explain why for each case. (5 marks)

d) Complete the title for the following Mining Design Guidelines (10 marks)

i) MDG 1
ii) MDG 2
iii) MDG 7
iv) MDG 10
v) MDG 15
vi) MDG 29
vii) MDG 36
viii) MDG 39
ix) MDG 41
x) MDG 43

e) All diesel engine systems must be designed in accordance to recognised and relevant Australian or International Standards and current engineering principles. List five (5) of the Standards for design nominated in MDG43. (5 marks)

f) All diesels engines systems must be identified as being either ExDES or FpDES. (10 marks).

ExDES is the abbreviation for _____ _____ _____ _____and must be designed and are required to operate safely in:

i)

ii)

iii)

FpDES is the abbreviation for _____ _____ _____ _____and must be designed and required to operate safely in:

i)

ii)

g) What are the requirements for gas testing of diesel engines used underground. (10 marks)

Question 6 (Elective – total 60 marks)

a) Which Australian Standard relates to conveyor safety? (5 marks)

b) What are the requirements of anti-runaway devices in relation to hazards to people? (5 marks)

c) Name three types of guarding techniques. (5 marks)

d) What components of a conveyor require guarding? (10 marks)

e) List five (5) items which may be found in an underground conveyor system which are required to be manufactured from fire resistant anti-static (F.R.A.S.) materials (10 marks)

f) List five (5) mandatory protective stop controls which are required to be installed on conveyors in underground coal mines. (10 marks)

g) Describe or by the aid of a sketch indicate where each of the mandatory stop controls will be located on a conveyor system. (15 marks)

Question 7 (Elective – total 60 marks)

You have been successfully appointed the holder of the nominated mechanical statutory function as set out in Schedule 10 of the NSW Work Health and Safety (Mines and Petroleum Sites) Regulations 2014. You have not previously worked in the mine's geographical location within New South Wales. The mine Operator requires a written response to the following information:

a) A list of ten (10) important statutory / safety / operational matters with which you would become familiar during the first three (3) months of commencing the role. (25 marks)

b) Each matter requires having a description of your expectations. (25 marks)

c) How would you set out the required information when presented to the Mine Operator? (10 marks)

Question 8 (Elective – total 60 marks)

You hold the nominated mechanical statutory function at a mine which utilises a partial extraction technique to produce coal, the Production Manager has contacted you to inform you that the continuous miner has broken the right hand track while completing a plunge cut. The crew have managed to recover the miner out of the cut and the Panel Fitter and Shift Engineer have determined the extent of the failure.

The right hand track is broken, there appears to be no tracks pads below the under frame and a number of track pads doubled up between the top frame and the main chassis of the miner. All alternatives have been exhausted to free the miner track and repair the miner. The last remaining option is to complete "Hot Works".

a) Provide details of the process you would undertake to complete "Hot Works"? (30 marks)

b) Develop an outline of the procedures required and authorisation/s required to be in place to complete the "Hot Works". (30 marks)

CME2 – Legislation and standards applicable to underground coal mines

Instructions to candidates

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Work Health and Safety Act 2011

Work Health and Safety Regulation 2011

Work Health and Safety (Mines and Petroleum Sites) Act 2013

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014

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All questions are to be attempted.

All questions are of equal value, but parts of questions may vary in value. The marks applicable to each part of a question will be indicated adjacent to the question.

Place your identification number only, NOT your name, on your paper.

10 minutes reading time is allowed prior to the start of the examination. Candidates can use a highlighter to mark points of importance during the reading time, but may not begin answering the questions.

This examination is an open book examination.

Question 1 (total 20 marks)

Please read the below scenario and answer the questions following.

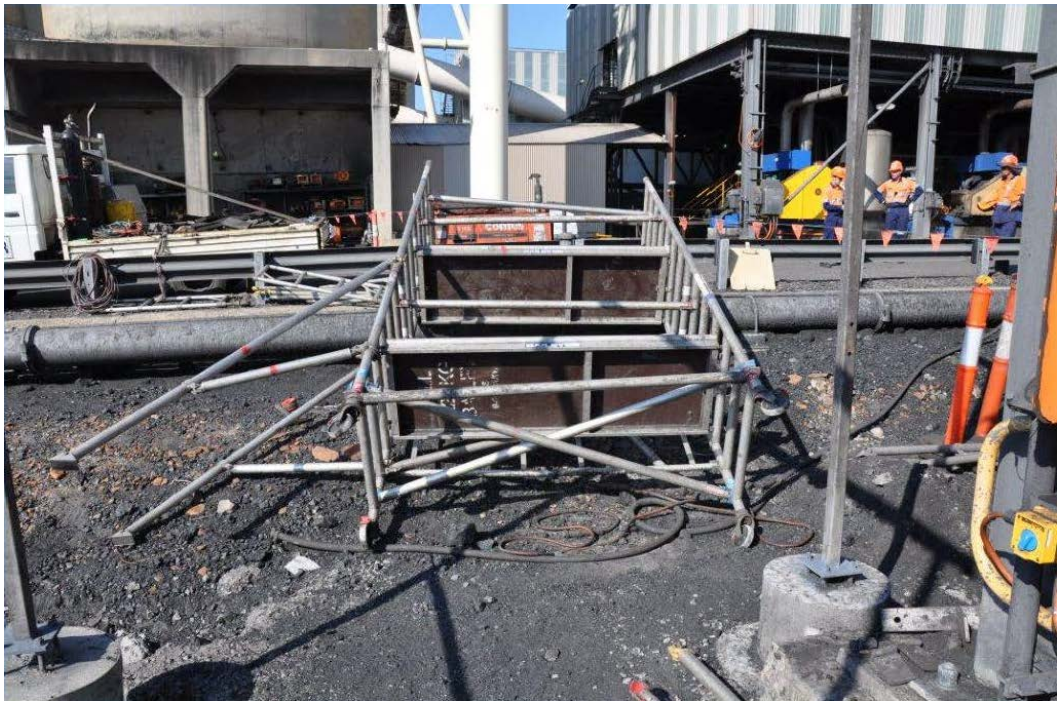
You hold the nominated mechanical statutory function as set out in Schedule 10 of the NSW, *Work Health and Safety (Mines and Petroleum Sites) Regulations 2014*.

The mine is currently undertaking major maintenance activities during three (3) weeks shut down over the Christmas / New Year period. Multiple contracting firms have been engaged to complete the scheduled works.

One of the major tasks is to replace a conveyor drive pulley on CV801 conveyor in the coal preparation plant. This task was contracted to F.F.F. Engineering Services. To gain access to the conveyor drive, sections of wall cladding and roofing are required to be removed. The task of removing and replacing the wall cladding and roof requires the use of scaffolding and a 60t hired mobile crane.

You received a phone call from the Mine Operator at 0715 hours on the 27th of December 20XX informing you of the following:

- During the process of replacing the roof section of the conveyor drive house, the roof section being lifted into position by the 60t mobile crane unexpectedly slewed and collided with the scaffolding, resulting in the scaffolding toppling over.
- A 33 year old male fitter (John Citizen) who was on the scaffold at the time of the collision was severely injured as a result of the fall and required transportation to hospital to be treated for his injuries being; fractures to his left femur and left ulna. (Photographs of incident site attached). The crane rigger (Joe Public) who was directing the crane driver witnessed the incident. The incident occurred at approximately at 0615 hours.



The Mine Operator has directed you to manage the incident, gather more information and contact the Regulator (being the Inspector of Mechanical Engineering).

a) What are your immediate actions and why? (5 marks)

b) What initial information are you going to gather and what information are you intending to provide to the Regulator. (5 marks)

c) Under which clause/s of the Regulations would you report this under and for what reasons? **Complete the attached Notification form (page 11)** including any assumptions if information is not provided. (10 marks)

Question 2 (total 20 marks)

The *Work Health and Safety (Mines and Petroleum Sites) Regulations 2014*, require Principal control plans to be developed at a mine or petroleum site.

a) What key control plan would you be required to develop as the holder of the nominated mechanical statutory function as set out in Schedule 10 of the NSW *Work Health and Safety (Mines and Petroleum Sites) Regulations 2014* and where would you locate the requirements for the development of this plan? (Detail all sections and references) (5 marks)

b) List the other clauses of the *Work Health and Safety (Mines and Petroleum) Regulations 2014*, *Work Health and Safety Regulations 2011* and other guidance material that should be referenced and included to assist in the development of the required control plan? (15 marks)

Question 3 (total 20 marks)

Work Health and Safety Regulations 2011, Chapter 5, Clause 203, Management of risk to health and safety states "A person with management or control of plant at a workplace must manage risks to health and safety associated with plant, in accordance with Part 3.1."

How would your mine apply this requirement to meet its obligations under this clause?

Question 4 (total 20 marks)

Your mine intends to introduce fire protected (FpDES) personnel transporters underground. The mine has known concentrations of methane. (20 marks)

a) What complete list of documentation would be required to introduce fire protected (FpDES) personnel transporters underground?

b) List the hazards and controls which will need to be mitigated as part of the introduction.

Question 5 (total 20 marks)

Please refer to attached Gazette (page 22).

REGISTRATION OF BRAKING SYSTEMS ON PLANT USED IN UNDERGROUND TRANSPORT DESIGN ORDER 2015

a) List a minimum of five (5) general types of mobile plant that this Gazette will be applicable to at mine sites. (5 marks)

b) What risk mitigations processes are required to be completed to comply with the Gazette and how would you implement the identified controls. (3 marks)

c) List the inspections / tests that you would require for three (3) types of mobile plant identified above to be completed on a scheduled basis to meet the testing and performance standards outlined in the Gazette. (12 marks)

NSW MAKING IT HAPPEN

NSW GOVERNMENT Department of Industry Resources Regulator

Mine Safety

Form

Notification of incident and injury

WHS (Mines and Petroleum Sites) Legislation

February 2016 | v1.0

Instructions

See the *Notification of incident and injury guide* before completing this form.

All notifiers must complete sections 1 and 3.

Complete section 2 if the incident involves the death, injury or illness of a person.

Attach additional copies of section 2 if more than one person has been injured.

An ancillary form may be required for some types of incidents.

Important

In the case of a notifiable incident, the site of the incident must be preserved until an inspector arrives or any earlier time that an inspector directs. See the attached notes for a list of notifiable incidents.

For all incidents a record must be kept with the mine record or petroleum site record. In the case of an incident at a coal mine, a copy of this notice must also be given to an industry safety and health representative.

1 Information required for notification of an incident

Name of mine or petroleum site	Wash
Site address of mine or petroleum site	Wash Road
Name of mine operator or petroleum site operator	Wash Services

2 About the incident

Date of incident (Or in the case of illness, the date the illness first reported by or on behalf of the person suffering the illness)		Time of incident	____:____ ____ HH MM AM:PM
Has this incident been previously reported to an inspector?	☐ Yes, verbally	☐ Yes, in writing	☐ No
Date incident previously reported			

Where did the incident occur?

Give exact details e.g. u/g heading, workshop, o/c bench, treatment plant

What was the nature of the incident?

Give details of any particular chemical, product, process or equipment involved.

e.g. 1 Foot slipped on wet rung of metal ladder
2 Chemicals stored in damaged containers
3 Repeatedly lifting 16kg bags of cement from pallet or trolley

What was the apparent cause of the incident?

Give details of any particular chemical, product, process or equipment involved.

e.g. 1 LHD brakes failed
2 Leak of caustic soda
3 Felt sudden pain in lower back although nothing extraordinary happened

Equipment involved

Give details of any type, make and model of equipment involved.

e.g. Type: Loader – u/g, Make: ABC, Model: 123-45

Type	Make	Model

Give details of action that has been taken, or will be taken, to prevent the incident from happening again.

Did anyone see the incident? If yes provide details of up to two people who observed the incident.

Person's name	Name of the person conducting business or undertaking in which the person works (*usually the employer; if self-employed, name of the business or undertaking).*	Phone number

Which *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* clauses and subclauses are applicable to the incident and/or injury?

Include all Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 clauses, subclauses and parts that are applicable to the incident and/or injury. Refer to the accompanying notes on page 7.

e.g. Cl 179(a)(xiii) collision involving a vehicle or mobile plant
Cl 178(a) an injury requiring immediate treatment as an in-patient
Cl 128(5)(o) unfit for ≥7 days
Cl 128(5)(a)-179(a)(ii)- a high potential incident involving an uncontrolled implosion, explosion or fire

3 Is an ancillary report required?

If this incident relates to any of the incidents below, then please also complete the relevant *Ancillary report form* and submit no later than 30 days after the incident was required to be reported.

☐ Cl 128(5)(i) the failure of the explosion-protection characteristics of explosion-protected plant while that plant is in service at an underground coal mine.

An ancillary report is only required if the failure relates to the explosion-protected characteristics of a diesel engine system.

☐ Cl 179(a)(ii), Cl 179(b) or Cl 128(5)(a) (see attached notes).

An ancillary report is only required if the incident involves a fire related to mobile plant.

Injuries or illness associated with the incident

Did the incident involve the death, injury or illness of a person?	☐ Yes - Provide the full name of each person below and complete section 2 of this form for each person. Attach additional copies of section 2 if required.	☐ No
Name		
Name		

Name		
Name		
Will additional information be forthcoming?	☐ Yes	☐ No

4 Information required for notification of a death, injury or illness

About the injured person

Surname			
Given names			
Date of birth		Gender	☐ Male ☐ Female

About the injured person (continued)

	Home address	Postal address If different to home address	
Street address			
City			
State			
Postcode			
Phone			
Fax			
Mobile			
Email			
Occupation			
Name of the person conducting business or undertaking in which the person works (usually the employer)(if self-employed, name of the business or undertaking).		Date employment commenced:	
Industry in which the business or undertaking is primarily conducted			
Type of work	☐ Full-time	☐ Part-time	☐ Casual ☐ Other

Job type	☐ Employee of operator ☐ Employee of contractor, other than labour hire company ☐ Employee of labour hire company ☐ Other, please specify _____

Usual shift start time	____:____ ____ HH MM AM:PM	Usual shift end time	____:____ ____ HH MM AM:PM
Start time on day of incident	____:____ ____ HH MM AM:PM		
Travel hours Number of hours worker spent travelling to work on the day of the incident		Rostered travel hours Number of hours worker spent travelling to and from work since the start of the current roster period	

Hours worked by worker in the last 7 calendar days before injury occurred Day 7 is the day of the incident	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7

Work experience in mining industry	____ years ____ months	Work experience in task at time of injury	____ years ____ months
Training for task	☐ None	☐ Basic	☐ Extensive

About the death, injury or illness as reported

Date of death, injury or illness (if other than incident date)		Time of injury/incident	
Date the death, injury or illness reported		Time injury or illness reported	

What was the injury or illness as reported?

Give full details including the nature of injury, the part of the body and any treatment.

What treatment did the person have?

☐ Hospital – inpatient admission
☐ Hospital – treatment
☐ Hospital – assessment only
☐ Doctor's surgery
☐ First-aid on site
☐ Other (specify)_____

What was the person doing just before the incident?

Consequences of incident

Tick all that apply, for example, 'lost time' may have occurred, and 'restricted duties' may be likely to occur.

	Occurred	Likely to occur	Potential to occur
Fatality	☐	☐	☐
Permanent incapacity	☐	☐	☐
Lost time*	☐	☐	☐
Restricted duties	☐	☐	☐
Medical treatment	☐	☐	☐

**Lost time means an inability to work for 1 day or more, not including the incident day.*

Did the worker stop work or normal duties?	☐ Yes	☐ No	When did the person stop work or normal duties?	
Is the worker expected to return to work?	☐ Yes	☐ No	What is the estimated return to work date?	

5 Information required for all notifications

Is this form submitted by or on behalf of the operator of a mine or petroleum site	☐ Yes	☐ No Provide details of the person conducting the business or undertaking (PCBU) making this notification
Details of PCBU other than the operator of a mine or petroleum site	Legal name	
	ACN if a company or ABN	
	Main business activity e.g. drilling	

Declaration

I declare that:

- I have authority from the mine operator /petroleum site operator /person conducting a business or undertaking to complete and submit this form on their behalf, and
- to the best of my knowledge, the information provided in this form, and any attachment to this form, is true and correct in every detail.

NOTE: Giving false or misleading information is a serious offence under section 268 of the *Work Health and Safety Act 2011*, and Part 5A of the *Crimes Act 1900*.

Name of authorised person		Position	
Contact telephone		Mobile	
Signature		Date	

Submitting the form

→ Mail, deliver, fax or email this form to your local office of NSW Department of Industry Mine Safety from the list on the next page.

→ Email notification is preferred.

This form may not be submitted to other offices of NSW Department of Industry

Do not submit pages 9-12.

In the case of an incident at a coal mine, a copy of this notice must also be given to an industry safety and health representative.

Maitland	NSW Department of Industry, Mine Safety PO Box 344 Hunter Region MC, NSW 2321	Phone: (02) 4931 6666 Fax: (02) 4931 6790 maitland.notification@indusry.nsw.gov.au
Armidale	No postal submission of forms. Email only	armidale.notification@industry.nsw.gov.au
Orange	NSW Department of Industry, Mine Safety Locked Bag 21 Orange NSW 2800 Phone: (02) 6360 5333	Fax: (02) 6360 5363 After-hours emergencies only: (02) 6360 5343 orange.notification@industry.nsw.gov.au
Broken Hill	NSW Department of Industry, Mine Safety PO Box 696 Broken Hill NSW 2880	Phone: (08) 8088 9300 Fax: (08) 8087 8005 brokenhill.notification@industry.nsw.gov.au
Cobar	No postal submission of forms. Email only	cobar.notification@industry.nsw.gov.au
Wollongong	NSW Department of Industry, Mine Safety PO Box 674 Wollongong NSW 2500	Phone: (02) 4222 8333 Fax: (02) 4226 3851 wollongong.notification@industry.nsw.gov.au
Lithgow	No postal submission of forms. Email only	lithgow.notification@industry.nsw.gov.au
Lightning Ridge	NSW Department of Industry, Mine Safety PO Box 314 Lightning Ridge NSW 2834	Phone: (02) 6829 9200 Fax: (02) 6829 0825 lightningridge.notification@industry.nsw.gov.au

Privacy statement

Information from this form is collected for the purpose of regulating work health and safety in mines and petroleum sites, and the administration and enforcement of the *Work Health and Safety Act 2011, Work Health and Safety (Mines and Petroleum Sites) Act 2013, Mining Act 1992, Petroleum (Onshore) Act 1991, Explosives Act 2003 and Radiation Control Act 1990*. The supply of this information is required by law. Information will be stored and managed in accordance with provisions under the *Privacy and Personal Information Protection Act 1998*. It will not be given to any other third party except as authorised by law. You may access or correct your personal information by contacting Governance & Information Requests Unit on (02) 9995 0911 or privacy@industry.nsw.gov.au. Further information regarding privacy can be obtained from the NSW Department of Industry website at www.http://www.industry.nsw.gov.au/privacy.

Disclaimer

The information contained in this publication is based on knowledge and understanding at the time of writing (February 2016). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the accuracy of the information with the appropriate officer of the Department of Industry, Skills and Regional Development or the user's independent adviser.

PUB16/40

Notes:

Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 clauses and subclauses

Part A Notifiable incidents

Incidents arising from the conduct of a business or undertaking at a mine or petroleum site that involve the following matters

Death of a person – Work Health and Safety (Mines and Petroleum Sites) Act 2013 Section 14

	Act Section Number	Section
	14(a)	the death of a person

Serious injury or illness – Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 Clause 178

	Regulation Clause Number		Clause
	178(a)		an injury or illness requiring the person to have immediate treatment as an in-patient in a hospital,
	178(b)	an injury or illness requiring the person to have immediate treatment for:	
	178(b)	(i)	the amputation of any part of his or her body
	178(b)	(ii)	a serious head injury
	178(b)	(iii)	a serious eye injury
	178(b)	(iv)	a serious burn
	178(b)	(v)	the separation of his or her skin from an underlying tissue (such as degloving or scalping),
	178(b)	(vi)	a spinal injury
	178(b)	(vii)	the loss of a bodily function
	178(b)	(viii)	serious lacerations
	178(c)		an injury or illness requiring the person to have medical treatment within 48 hours of exposure to a substance
	178(d)		a fracture to a person's bone other than a bone in the person's hand (including a finger) or foot (including a toe)
	178(e)		a condition prescribed as a serious illness for the purposes of section 36 of the WHS Act. **Note.** See clause 699 of the WHS Regulations

Prescribed serious illnesses – Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 Clause 178 and Work Health and Safety Regulation 2011 Clause 699

	Regulation Clause Number	Clause	
	699(a)	Any infection to which the carrying out of work is a significant contributing factor, including any infection that is reliably attributable to carrying out work:	
	178(e)	699(a) (i)	with micro-organisms
	178(e)	699(a) (ii)	that involves providing treatment or care to a person
	178(e)	699(a) (iii)	that involves contact with human blood or body substances
	178(e)	699(a) (iv)	that involves handling or contact with animals, animal hides, skins, wool or hair, animal carcasses or animal waste products
		The following occupational zoonoses contracted in the course of work involving handling or contact with animals, animal hides, skins, wool or hair, animal carcasses or animal waste products:	
	178(e)	699(b)(i)	Q fever
	178(e)	699(b) (ii)	Anthrax
	178(e)	699(b) (iii)	Leptospirosis
	178(e)	699(b) (iv)	Brucellosis
	178(e)	699(b) (v)	Hendra Virus
	178(e)	699(b) (vi)	Avian Influenza
	178(e)	699(b) (vii)	Psittacosis

NOTE: The *Public Health Act 2010* also imposes obligations relating to the notification of certain medical conditions.

Dangerous incidents – Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 Clause 179

	Regulation Clause Number	Clause	
	179(a)	an incident in relation to a workplace that exposes a worker or any other person to a serious risk to a person's health or safety emanating from an immediate or imminent exposure to:	
	179(a)	(i)	an uncontrolled escape, spillage or leakage of a substance
	179(a)	(ii)	an uncontrolled implosion, explosion or fire (Note: Licence holders under the *Explosives Act 2003* have obligations to notify the regulator of certain incidents involving explosives)
	179(a)	(iii)	an uncontrolled escape of gas or steam
	179(a)	(iv)	an uncontrolled escape of a pressurised substance
	179(a)	(v)	the fall or release from a height of any plant, substance or thing
	179(a)	(vi)	the collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be authorised within the meaning of Part 4 of the WHS Act
	179(a)	(vii)	the collapse or partial collapse of a structure
	179(a)	(viii)	the collapse or failure of an excavation or of any shoring supporting an excavation
	179(a)	(ix)	the inrush of water, mud or gas in workings at an underground excavation or tunnel
	179(a)	(x)	the unintended interruption of the main system of ventilation at an underground excavation or tunnel
	179(a)	(xi)	the loss of control of heavy earthmoving machinery (including any failure of braking or steering)
	179(a)	(xii)	the unintended activation, movement, or failure to stop of vehicles or machinery
	179(a)	(xiii)	a collision involving a vehicle or mobile plant

	Regulation Clause Number		Clause
	179(a)	(xiv)	damage to, or failure of, any part of a powered winding system or a shaft or shaft equipment
	179(a)	(xv)	damage to any plant or structure
	179(a)	(xvi)	a failure of ground, or of slope stability control measures
	179(a)	(xvii)	rock falls, instability of cliffs, steep slopes or natural dams, occurrence of sinkholes, development of surface cracking or deformations or release of gas at surface, due to subsidence
	179(a)	(xviii)	a vehicle or plant making contact with an energised source having a voltage greater than 1,200 volts (other than testing equipment applied to energised equipment in accordance with the WHS Regulations)
	179(b)		a fire in the underground parts of a mine, including where the fire is in the form of an oxidation that releases heat and light
	179(c)		an electric shock to a person (other than a shock due to extra low voltage)
	179(d)		any initial indication that any underground part of a coal mine is subject to windblast, outbursts or spontaneous combustion
	179(e)		the unintended overturning of any vehicle or of plant weighing more than 100 kilograms
	179(f)		ejection of fly rock so that it falls outside an exclusion zone (being an area from which persons are excluded during blasting)
	179(g)		any initial indication that there may be a fault in the cementing of a casing string forming part of the cement casing of a well

Part B – Other incidents arising out of the carrying out of mining or petroleum operations at a mine or petroleum site – *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* Clause 128

The requirement to notify the regulator of these matters applies to operators of a mine or petroleum site. Other persons conducting a business should notify the operator if such an incident occurs and the operator must notify the regulator.

	Regulation Clause Number		Clause
	128(5)(a)	an event referred to in clause 179 (a) (i)–(xviii) that would have been a dangerous incident if a person were in the vicinity at the time when the incident or event occurred and in usual circumstances a person could have been in that vicinity at that time:	
	128(5)(a)	179(a)(i)	an uncontrolled escape, spillage or leakage of a substance
	128(5)(a)	179(a)(ii)	an uncontrolled implosion, explosion or fire (Note: Licence holders under the *Explosives Act 2003* have obligations to notify the regulator of certain incidents involving explosives)
	128(5)(a)	179(a)(iii)	an uncontrolled escape of gas or steam
	128(5)(a)	179(a)(iv)	an uncontrolled escape of a pressurised substance
	128(5)(a)	179(a)(v)	the fall or release from a height of any plant, substance or thing
	128(5)(a)	179(a)(vi)	the collapse, overturning, failure or malfunction of, or damage to, any plant that is required to be authorised within the meaning of Part 4 of the WHS Act
	128(5)(a)	179(a)(vii)	the collapse or partial collapse of a structure
	128(5)(a)	179(a)(viii)	the collapse or failure of an excavation or of any shoring supporting an excavation
	128(5)(a)	179(a)(ix)	the inrush of water, mud or gas in workings at an underground excavation or tunnel
	128(5)(a)	179(a)(x)	the unintended interruption of the main system of ventilation at an underground excavation or tunnel
	128(5)(a)	179(a)(xi)	the loss of control of heavy earthmoving machinery (including any failure of braking or steering)
	128(5)(a)	179(a)(xii)	the unintended activation, movement, or failure to stop of vehicles or machinery
	128(5)(a)	179(a)(xiii)	a collision involving a vehicle or mobile plant

	Regulation Clause Number		Clause
	128(5)(a)	179(a)(xiv)	damage to, or failure of, any part of a powered winding system or a shaft or shaft equipment
	128(5)(a)	179(a)(xv)	damage to any plant or structure
	128(5)(a)	179(a)(xvi)	a failure of ground, or of slope stability control measures
	128(5)(a)	179(a)(xvii)	rock falls, instability of cliffs, steep slopes or natural dams, occurrence of sinkholes, development of surface cracking or deformations or release of gas at surface, due to subsidence
		179(a)(xviii)	a vehicle or plant making contact with an energised source having a voltage greater than 1,200 volts (other than testing equipment applied to energised equipment in accordance with the WHS Regulations)
	128(5)(b)		the detection of a concentration of methane in the general body of the air at an underground coal mine (other than in a sealed area or goaf) greater than 2% by volume
	128(5)(c)		an unplanned fall of ground, roof or sides that impedes passage, extends beyond the bolted zone or disrupts production or ventilation
	128(5)(d)		a failure of ground support where persons could potentially have been present
	128(5)(e)		the burial of machinery such that it cannot be recovered under its own tractive effort
	128(5)(f)		progressive pillar failure or creep
	128(5)(g)		a sudden pillar collapse
	128(5)(h)		an electric arc occurring in the hazardous zone that is directly observed or that leaves visible evidence on an electric cable
	128(5)(i)		the failure of the explosion-protection characteristics of explosion-protected plant while that plant is in service
	128(5)(j)		a misfire or unplanned explosion of an explosive or explosive precursor
	128(5)(k)		an unplanned event that causes the withdrawal of more than one person from the mine or petroleum site or part of the mine or petroleum site
	128(5)(l)		an unplanned event that causes less than 2 exits from the mine or petroleum site to be available for use
	128(5)(m)		any indication from monitoring data of the development of subsidence which may result in damage to any plant or structure or a failure of ground
	128(5)(n)		an injury to a person (supported by a medical certificate) that results in or is likely to result in the person being unfit, for a continuous period of at least 7 days, to perform person's usual activities at the person's place of work
	128(5)(o)		the illness of a person (supported by a medical certificate) that is related to a work process and that results in or is likely to result in the person being unfit, for a continuous period of at least 7 days, to perform person's usual activities at the person's place of work
	128(1)(a)		results in illness or injury that requires medical treatment by a doctor, being the management or care of a patient including: (a) the suturing of a wound, (b) the treatment of fractures, (c) the treatment of bruises by drainage of blood, (d) the treatment of second and third degree burns, but not including diagnostic procedures, observation, counselling, first aid or therapeutic measures taken solely for preventative purposes.

Question 5 a) attachment

Explanatory note

From 1 July 2015, any reference to the Department of Trade and Investment, Regional Infrastructure and Service is a reference to the Department of Industry, Skills and Regional Development in accordance with the *Administrative Arrangements (Administrative Changes—Public Service Agencies) Order (No 2) 2015*.

REGISTRATION OF BOOSTER FANS DESIGN ORDER 2015

under the

WORK HEALTH AND SAFETY (MINES) REGULATION 2014

1 Name of Order

This Order is the *Registration of Booster Fans Design Order 2015*.

2 Commencement

This Order commences on 1 July 2015.

3 Interpretation

In this Order:

MDG is a reference to mining design guidelines produced by the NSW Government and published on the Department of Trade and Investment, Regional Infrastructure and Services website.

4. Design requirements

All booster fans used in underground coal mines must be designed in accordance with Section 3 and 4.1 of MDG 3 *Main fans, booster fans and auxiliary fans in underground coal mines*, as amended from time to time.

5. Testing and performance requirements

All booster fans must meet the testing and performance standards set out in Sections 3 and 4.1 of MDG 3, as amended from time to time.

WORK HEALTH AND SAFETY (MINES) REGULATION 2014

Registration of Braking Systems on Plant Used in Underground Transport Design Order 2015

I, Douglas Revette, Executive Director Governance, with the delegated authority of the Secretary, Department of Trade and Investment, Regional Infrastructure and Services in pursuance of clause 177 (5) of the *Work Health and Safety (Mines) Regulation 2014* ("the Regulation") make the following Order.

Dated this 25th day of June 2015.

DOUGLAS REVETTE
Executive Director Governance
Department of Trade and Investment, Regional Infrastructure and Services

Explanatory note

From 1 July 2015, any reference to the Department of Trade and Investment, Regional Infrastructure and Service is a reference to the Department of Industry, Skills and Regional Development in accordance with the *Administrative Arrangements (Administrative Changes—Public Service Agencies) Order (No 2) 2015*.

REGISTRATION OF BRAKING SYSTEMS ON PLANT USED IN UNDERGROUND TRANSPORT DESIGN ORDER 2015

under the

WORK HEALTH AND SAFETY (MINES) REGULATION 2014

1 Name of Order

This Order is the *Registration of Braking Systems on Plant Used in Underground Transport Design Order 2015*.

2 Commencement

This Order commences on 1 July 2015.

3 Interpretation

In this Order:

AS is a reference to Australian Standards.

AS/NZS is a reference to Australian/New Zealand Standards.

braking system includes all components which combine together to stop or hold the transport.

ISO is a reference to International Organisation for Standardisation.

MDG is a reference to mining design guidelines produced by the NSW Government and published on the Department of Trade and Investment, Regional Infrastructure and Services website.

Regulation means the *Work Health and Safety (Mines) Regulation 2014*.

transport means mobile plant used for the purpose of transporting persons, materials, coal or stone, whether by carrying, towing or otherwise and includes:

(a) a locomotive, or

(b) a rubber tyred or caterpillar tracked vehicle (including a shuttle car) propelled by electrical or mechanical means.

4 Revocation of *Requirements for Design Registration of Braking System on Plant Used in Underground Transport (TBS)*

Pursuant to clause 177 (5) and clause 34 (5) of Schedule 12 of the Regulation, the *requirements for Design Registration of Braking System on Plant Used in Underground Transport (TBS)* published in *NSW Government Gazette* No 24 of 2 February 2007 at page 666 is revoked, as is any Notice revived as a result of their revocation.

5 Design requirements

(1) All braking systems on plant used in underground transport and used in underground coal mines must be designed in accordance with the following standards, as amended from time to time:

(a) Sections 1 and 3 of the MDG 39:2001 *Handbook for approval assessment of transport braking systems on free-steered vehicles in underground coal mines*;

(b) MDG 39 Amendments No.1 December 2006;

(c) Section 3 of the MDG 2:1991 *Design Guidelines for the Construction of Locomotives*.

(2) The design risk assessment on the braking system on plant used in underground transport must identify and control all foreseeable unintended movement events that may occur during the intended life of the braking system. The risk assessment must consider:

(a) the entirety of the braking system, and

(b) reasonably foreseeable misuse and reasonably foreseeable human error; and

(c) possible failure modes of the braking system.

(3) Control measures must be identified as either:

(a) a safety related function; or

(b) a safety related componentry.

(4) All safety related componentry must be designed and analysed using appropriate engineering practices and according to current engineering standards:

(a) safety related componentry must be systematically analysed to determine all reasonably foreseeable failure modes and to verify that a sufficient level of reliability has been achieved; and

(b) systematic analysis methods such as a failure modes effects analysis, fault tree analysis or other similar analysis methods must be used to assess safety related componentry and to determine lifecycle inspection, maintenance, test and discard requirements, as required for lifecycle functionality; and

(c) consideration must be given to fatigue testing or analysis, where applicable.

6 Testing requirements and performance standards

(1) Braking system testing and performance must comply with the relevant requirements set out in the following standards, as amended from time to time:

(a) Sections 1 and 3 of the MDG 39:2001 *Handbook for approval assessment of transport braking systems on free-steered vehicles in underground coal mines*; and

(b) Section 3 of the MDG 2:1991 *Design Guidelines for the Construction of Locomotives*.

(2) Safety related functions, which keep the transport under control by use of braking systems, must be designed and assessed using the following functional safety standards, as amended from time to time, as applicable to the design architecture and type of components used:

(a) application of performance levels in accordance with:

i. AS/NZS 4024.1503:2014 *Safety of machinery – Safety-related parts of control systems – General principles for design*, or

ii. ISO 13849-1:2006 *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*.

(b) application of safety integrity levels in accordance with:

i. AS 61508.1:2011 *Functional safety of electrical/electronic/programmable electronic safety-related systems – General requirements*; or

ii. AS 62061-2006 *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*.

(c) application of safety categories in accordance with:

i. AS 4024.1501:2006 (R2014) *Safety of machinery – Design of safety related parts of control systems – General principles for design*; and

ii. AS 4024.1502:2006 *Safety of machinery – Design of safety related parts of control systems – Validation*.

(d) other relevant functional standards, provided an equivalent level of safety can be demonstrated.

(5) All safety related functions must be tested and independently assessed and verified against the applicable functional safety standard, so far as is reasonably practicable.

WORK HEALTH AND SAFETY (MINES) REGULATION 2014

Registration of Breathing Apparatus to Assist Escape (Including Self-Rescuers) Design Order 2015

I, Douglas Revette, Executive Director Governance, with the delegated authority of the Secretary, Department of Trade and Investment, Regional Infrastructure and Services in pursuance of clause 177 (5) of the *Work Health and Safety (Mines) Regulation 2014* ("the Regulation") make the following Order.

Dated this 25th day of June 2015.

DOUGLAS REVETTE
Executive Director Governance
Department of Trade and Investment,
Regional Infrastructure and Services

Explanatory note

From 1 July 2015, any reference to the Department of Trade and Investment, Regional Infrastructure and Service is a reference to the Department of Industry, Skills and Regional Development in accordance with the *Administrative Arrangements (Administrative Changes—Public Service Agencies) Order (No 2) 2015*.

More information

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Acknowledgments

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