JER-8000-MGT-PRO-0045 Excavation & Trenching

(AS/NZS, ISO 45001:2018, Clause 8.1.2)

1. SCOPE

The procedure applies to all KGL Resources Workers who are required to work in or around excavations and trenches.

2. PURPOSE OF DOCUMENT

The purpose of this procedure is to provide guidelines for KGL Resource workers who are required to undertake or work around excavations and trenches.

3. RELEVANT LEGAL & OTHER REQUIREMENTS

It is the responsibility of all personnel to comply with this procedure and seek guidance from the Project Director where clarification is required.

- Work Health and Safety Act 2011 (NT)
- Work Health and Safety Regulation 2011 (NT)'
- Code of Practice-Excavation Work

4. DEFINITIONS

Competent Person	A person who (whether by experience or training or both) has the appropriate subject matter skills and knowledge to undertake work task/ activity/ function safely, within the excavation correctly, effectively and efficiently.
Battering	Wall of excavation sloped back at an angle not exceeding 45° and bottom vertical face not exceeding 1.5 metres
Benching	Terracing or stepping the sides of an excavation to prevent a cave-in. Forming one or more horizontal levels or stepped sides to an excavation or trench, by forming a series of vertical and horizontal planes on either side of the excavation site (for a trench greater than 1.5 metres in depth the wall of each bench cut shall be no higher than it is wide nor shall any vertical face exceed 1.5 metres in height without the written consent of a geo-technical engineer).
Excavation	Means a hole in the earth, or a face of earth, formed after rock, sand, soil or other material is removed. Examples include: 1. a trench, ditch, shaft, well, tunnel, pier hole, cutting, caisson or cofferdam 2. a hole drilled in the earth Excavations may also meet the definition of a confined space, where there is a risk of engulfment or unsafe atmosphere due to presence of hazardous fumes and gases. Workers should refer to KGL Resources' Confined Space Procedure.
Ground Disturbance	A ground disturbance is any work, operation, or activity that results in a disturbance of the earth, or that result in a reduction of the initial installation cover over a buried facility Includes: trenching, directional drilling, thrusting, piling, hydro-vacuum excavation, hand digging.

High Risk Construction Work	Has the same meaning under the WHS Regulation, namely construction work involving: a. a risk of a person falling more than 2 metres; b. demolition of an element of a structure that is load-bearing or otherwise related to the physical integrity of the structure; c. or is likely to involve, the disturbance of asbestos; d. structural alterations or repairs that require temporary support to prevent collapse; e. work that is carried out in or near a confined space' f. work that is carried out in or near: i. a shaft or trench with an excavated depth greater than 1.5 metres, or ii. a tunnel; g. the use of explosives; h. work that is carried out on or near pressurised gas distribution mains or piping; i. work that is carried out on or near chemical, fuel or refrigerant lines; j. work that is carried out on or near energised electrical installations or services; k. work that is carried out in an area that may have a contaminated or flammable atmosphere; l. tilt-up or precast concrete; m. work that is carried out on, in or adjacent to a road, railway, shipping lane or other traffic corridor that is in use by traffic other than pedestrians; n. work that is carried out in an area at a workplace in which there is any movement of powered mobile plant; o. work that is carried out in an area in which there are artificial extremes of temperature; p. work that is carried out in or near water or other liquid that involves a risk of drowning; or diving work.
Permit to Work	A Permit to Work (PTW) is a permit that explicitly records and tracks the authorisation and communication of all specified – high risk tasks involved with a work activity.
Shoring	A system of temporary supports and sheeting material used to maintain the stability of the sides of an excavation (shoring may also be known as shielding).
Spotter	A person assigned to have visual and direct communication with the work crew impacted by a hazard(s).
SWMS	A SWMS is a pre-start risk assessment that is undertaken prior to commencing any high-risk construction work or as otherwise required by a supervisor or manager. A SWMS must be completed in accordance with the KGL Resource Risk Management Procedure.
Take 5	A pre-start risk assessment that is undertaken by all workers prior to commencing work. A Take 5 must be completed in accordance with the KGL Resource Risk Management Procedure.

Trenching	Means an excavation where the maximum depth is more than the minimum width
Workers	Workers include employees, contractors, sub-contractors, volunteers, visitors and consultants who conduct work for KGL Resources.
Zone of Influence	The depth of the excavation plus 1-m out from the edge of the excavation within which no load bearing activities must take place. Within this zone, an external load (e.g. vehicles, plant, excavated material, etc) may affect the excavation's stability or an excavation may influence the stability of any nearby structure.

5. RESPONSIBILITIES

Senior Leadership Team	1. Ensure that workers operate within a safe system of work that mitigate excavation and trenching risks. 2. Ensure adequate resources are provided so that managers and/or supervisors and workers can comply with this procedure. 3. Review and act on reported organisational risk management performance. 4. Appoint competent persons to act as a PTW recipient.
Safety Manager	1. Ensures this procedure is fit for purpose and meets all legislative requirements. 2. Ensures that this procedure is implemented and is regularly reviewed and monitored for ongoing effectiveness. 3. Supports managers and supervisors in the implementation and operation of this procedure. 4. Recommends change or improvement to this procedure as required. 5. Provides advice on excavation and trenching competency requirements. 6. Reviews and monitors excavation and trenching competency requirements by managers and supervisors.
Managers and Supervisors	1. Managers and supervisors are responsible for ensuring this procedure is implemented in their area and this may include ensuring that: a. all workers are aware of and understand this procedure; b. workers are provided with appropriate training in relation to the risks arising from excavation and trenching and the appropriate control measures; c. workers receive appropriate instruction in the correct use and maintenance of personal protective equipment (**PPE**) and respiratory protective equipment (**RPE**); d. workers use the required PPE and RPE; e. workers comply with the Excavation Permit and f. workers are briefed on the client's excavation and trenching procedures before work in excavation and trenching.
Worker	1. Complies with all requirements in this procedure when working in a excavation and trenching, including: a) participating in risk assessments for excavation and trenching Work; b) implementing all identified control measures.

6. GUIDING PRINCIPLES

At KGL RESOURCES we:

- Apply higher order controls in the hierarchy of controls
- Only use administrative controls (such as procedures) and personal protective equipment (**PPE**) in conjunction with other risk controls or where there are no other risk controls available. Further information is available in specific procedures that relate to these risks.
- Comply with all procedures and instructions
- STOP work if it seems unsafe
- Do not carry out work unless we are competent and trained to perform the task
- Check the plant, equipment and PPE each time we perform a task
- Report all hazards, incidents and near hits
- Wear and use appropriate PPE.
- When in doubt, escalate the concern.

7. EXCAVATION & TRENCHING RISK MANAGEMENT

Excavation which includes trenching at depths greater than 1.5m work is high risk construction as defined under WHS legislation. Regarded as one of the most hazardous construction operations, failure occurs very quickly, giving a worker virtually no time to escape, especially if the collapse is extensive and the excavation is a trench. Normally, a slab of earth collapses off the trench face under its own weight and breaks against the opposite wall of the excavation, burying and crushing any person in its path. This can result in death by suffocation or internal injuries.

The two main hazards associated with excavations and trenches are:

a. Collapse, and

b. Accidental rupturing of underground services, in particular, high voltage electrical cables and gas mains

KGL Resource manages risk associated with excavation and trenching through a risk management approach. The key elements of KGL Resource's systematic approach to risk management include:

a. hazard identification;

b. risk assessment;

c. controlling risks; and

d. reviewing control measures to ensure they remain effective.

This is to be undertaken in line with the **KGL Resource Risk Management procedure.**

Before undertaking any work involving hazardous substances, workers:

a. Must complete a **Take 5**; and

b. If applicable, complete a SWMS.

c. Any decisions and reasons for the decisions about risk management must be documented in accordance with this procedure.

7.1 Planning

The scope of the job and the hazards that can be encountered will dictate the amount of planning that is required. Pre-job planning and hazard analysis is the first step in excavation process.

In the planning of all excavation work a site inspection shall be carried out by Competent Person(s) in order to analyse hazards and assess the risks associated with the proposed work. During the site inspection practical site-specific control measures shall be developed for the job to minimise the risk so far as reasonably practicable. The findings from the site inspections shall be documented in a Safe Work Method Statement (SWMS).

7.2 Hazard Identification

Before workers undertake any work in an excavation or trench, managers and supervisors must identify hazards to which any worker could be expose to as a result of the work. These hazards must be identified in the Excavation Permit (and SWMS where applicable).

The purpose of identifying hazards associated with Excavation & Trenching Work is to eliminate or, if it is not reasonably practicable to eliminate the risk, to minimise it so far as is reasonably practicable.

Hazards arising from Excavation and Trenching Work may include:

a. Unstable rock or soil
b. Underground water tables
c. Sudden inundation - flooding
d. Machinery being moved near the excavation
e. Fumes from vehicles or other plant in or near the excavation
f. Structures near the excavation
g. Piles of excavated material beside the excavation
h. Underground services
i. Static loads near an excavation
j. Dynamic loads near an excavation, such as traffic or excavation equipment
k. Contaminated soils including acid sulphate soils
l. Ground vibration such vibration that may come from heavy traffic, passing close to an excavation, excavation machinery, construction works in the immediate vicinity (e.g. pile driving), explosives use
m. Lack of barriers around excavations

7.3 Risk Assessment

Examples of control measures include:

a. Plant fitted with suitable overhead protection against the collapse of the excavation
b. Benching, battering or shoring the sides of the excavation
c. A barrier to prevent access by persons
d. A secure cover over the excavation
e. Filling the excavation as soon as possible
f. Ensuring there is adequate ventilation to prevent exposure to carbon monoxide

g. Detection, identification and protection of underground services

7.4 Adjacent buildings and structures

Excavation work may seriously affect the security or stability of any part of a structure at or adjacent to the location of the proposed excavation which can lead to structural failure or collapse. Excavation work must not commence until steps are taken to prevent the collapse or partial collapse of any potentially affected building or structure.

7.5 Unexpected Indigenous Objects

In the case of unexpected aboriginal objects found during excavation works, there may be reporting, extraction and/or containment requirements to be applied. Refer to the Environmental Management Plan and its associated procedures.

7.6 Protection of underground services

To prevent the accidental rupturing of any power cable or other underground service, the following protection measures shall be confirmed:

a. Where the excavation is within the zone of influence, or within three (3) metres of any underground service, the location of those services shall be found and clearly labelled. Local services drawings should be referenced to physically determine the location of underground services.

b. Detailed assessment of how the work shall be undertaken to ensure that accidental damage or rupture of that service is prevented.

c. Consider the use of "pot-holing" or detection machines to locate electrical cables where unable to determine with a high level of confidence the location from plans.

d. De-energising of underground services may also be required.

7.7 Barricades and safety signage

Appropriate barricades and notifications shall be put in place to demarcate and prevent persons or equipment falling in as follows:

a. A barricade at least 900mm high must be erected around a trench that is 1 metre or more in depth unless other suitable controls are in place to prevent falls and unauthorised access

b. Unattended excavations shall be barricaded or covered and appropriate signage placed adjacent to the excavation. This control should only be used for the shortest practicable period of time.

7.8 Benching, Batters and Shoring

If it is necessary for persons to enter an excavation where there is unstable and/or material prone to collapse, the sides must be battered at a safe angle or another form of protection put in place.

Where access is required into an excavation over 1.5 metres deep, the excavation must be shored, battered or benched unless approved by a Geo-technical Engineer in writing. This approval must remain on site during the open excavation.

7.9 Mobile plant and materials

Where an excavator or other plant is to be used, ensure that the work area is free from obstructions including overhead power lines. Mechanical plant, vehicles, storage of materials (including excavated material) or any other heavy loads should not be in the immediate vicinity of an excavation where this could impact on safety.

The ground support system installed to carry mobile plant, and materials shall be designed by a competent person, for example, a geotechnical engineer, to carry such loads.

7.10 Surface Water and Drainage

In excavations, the safety of faces and fill materials often depends on the effectiveness of the control of surface and groundwater. To control surface and groundwater, cut-off drains, constructed parallel, and a safe distance back from the face, shall be incorporated to collect water and discharge it clear of the working area where the risk warrants this. Drains may also be necessary in the excavation itself. Any inflow should be collected in sumps and pumped clear of the excavation.

When heavy rain occurs:

a. All work shall cease and workers removed from the excavation

b. Excavations must be carefully inspected after rain and before employees are permitted to re-enter the trench.

7.11 Harmful gases and vapours

Workers must be protected against the effects of toxic or explosive gases that may be encountered or created when working in excavations. Where there is a risk of harmful gases or vapours, workers must work in accordance with this procedure, and KGL Resources' Confined Space Procedure.

7.12 Access/Egress

Excavations with a depth greater than 1.5 meters must be provided with safe means of access and egress, such as secure ladders, located no more than 9 metres apart in horizontal travel in the part of the trench where a worker will be.

7.13 Personal Protective Equipment

The requirement for specific personal protective equipment (PPE) must be identified during the hazard analysis before commencement of work as detailed in the Excavation Permit.

7.14 Emergency contingency

The SWMS shall document applicable rescue procedures in the event of an incident which results in the extraction of persons. As a minimum the SWMS shall refer to emergency contingency requirements specific to the work site and persons involved, including:

a. Contacting Emergency Services e.g. telephone (000)

b. Security of the incident scene – clearing all unwanted workers and bystanders

c. Emergency rescue equipment as determined by the risk analysis. Examples include but are not limited to include self-contained breathing apparatus (SCBA), harness with lifeline, and basket stretcher.

d. Rescue team composition and readiness

e. Protecting the scene of the incident and the area around excavation from further disturbance e.g. batter the sides of the trench in the collapsed area or insert shoring where possible to protect the victim and rescuers.

f. Rescue methods to support locating, securing and extraction of the victim(s) including:

   (i) Remove the collapsed soil with shovels or if it is a very deep trench, with a machine

   (ii) Allow no-one on top of the collapsed soil, as this will increase the pressure on the victim

(iii) If the trench is over 1.5 metres deep, rescuers are to wear safety harnesses and life lines which extend to the surface

(iv) If a machine is used, take extreme care to avoid further injury to the victim

(v) When rescuers are near the victim, hands should be used to remove the soil if possible. If shovels have to be used, these are to be used with caution

(vi) First aid provisions including the preparation of a brief to the rescue team:

(1) When the victim is located, clear soil from head and chest, and check for breathing and a pulse. If no signs of life are present, start Cardio-Pulmonary Resuscitation (CPR)

(2) If the victim's chin is pressed onto his/her chest, tilt the head back as soon as possible so as to open up the airway to the lungs. This can be done while other rescuers are freeing the soil from the upper part of his/her body and before starting CPR

(3) Checking for injuries

(4) Not to remove the victim by tying a rope around him/her and pulling the rope

(5) Where it is safe to do so leave the victim in the trench until the ambulance or qualified medical person arrives

g. Preservation of the incident scene after recovery of victim/s

h. Return to work authorisation and control.

7.15 Risk Control Measures

As set out in KGL Resource's Risk Management Procedure, control measures should always be considered in the order of the hierarchy of controls starting with elimination. In some circumstances, two or more control measures will be required to minimise so far as is reasonably practicable the risk(s).

KGL Resource applies the Hierarchy of controls to eliminating, so far as is reasonably practicable, or minimising the risks arising from excavation and trenching. Set out in **Table 1** below are some examples of risk control measures to eliminate or minimise these risks according to the hierarchy of control.

Table 1: Risk Control Measures

Risk Control Hierarchy		**Example of risk control measures for Confined Space Work**
Level 1	Eliminate the hazards	• Eliminate the need to work in or around an excavation or trench; and • Undertake work using devices that can enter the excavation or trench without entry.
Level 2	Substitute the hazard with something safer	Use a vacuum excavation instead of heavy impact machinery
	Isolate the hazard from people	Using Isolation methods such as concrete barriers to prevent materials & people from entering the excavation or trench.

	Reduce the risks through engineering controls	Bench, batter or shore the sides to reduce risk of ground collapse.
Level 3	Reduce exposure to the hazard using administrative actions	• specific procedures (such as the SWMS and Excavation Permit) and specific prohibitions and restrictions; • use of signage; • first aid & emergency response, including rescue planning; and • workforce training.
	Use PPE and RPE	Supply and use of appropriate PPE and RPE when required.

Level 1	
Elimination	
Eliminate the hazards	Eliminate the need to undertake excavation work.
Level 2	
Isolation	
Adjacent buildings and structures	Excavation work may seriously affect the security or stability of any part of a structure at or adjacent to the location of the proposed excavation which can lead to structural failure or collapse. Excavation work must not commence until steps are taken to prevent the collapse or partial collapse of any potentially affected building or structure.
Benching, Batters and Shoring	If it is necessary for persons to enter an excavation where there is unstable and/or material prone to collapse, the sides must be battered at a safe angle or another form of protection put in place. Where access is required into a excavation over 1.5 metres deep, the excavation must be shored, battered or benched unless approved by a Geo-technical Engineer in writing. This approval must remain on site during the open excavation.
Engineer	
Surface Water and Drainage	In excavations, the safety of faces and fill materials often depends on the effectiveness of the control of surface and groundwater. To control surface and groundwater, cut-off drains, constructed parallel, and a safe distance back from the face, shall be incorporated to collect water and discharge it clear of the working area where the risk warrants this. Drains may also be necessary in the excavation itself. Any inflow should be collected in sumps and pumped clear of the excavation. When heavy rain occurs:

	a. All work shall cease and workers removed from the excavation. b. Excavations must be carefully inspected after rain and before employees are permitted to re-enter the trench.
Mobile plant and materials	Where an excavator or other plant is to be used, ensure that the work area is free from obstructions including overhead power lines. Mechanical plant, vehicles, storage of materials (including excavated material) or any other heavy loads should not be located in the immediate vicinity of an excavation where this could impact on safety. The ground support system installed to carry mobile plant and materials shall be designed by a competent person, for example, a geotechnical engineer, to carry such loads.
Access/Egress	Excavations with a depth greater than 1.5 meters must be provided with safe means of access and egress, such as secure ladders, located no more than 9 metres apart in horizontal travel in the part of the trench where a worker will be.
Level 3	
Administrative and or personal protective equipment	
Barricades and safety signage	Appropriate barricades and notifications shall be put in place to demarcate and prevent persons or equipment falling in as follows: a. A barricade at least 900mm high must be erected around a trench that is 1 metre or more in depth unless other suitable controls are in place to prevent falls and unauthorised access **b.** Unattended excavations shall be barricaded or covered and appropriate signage placed adjacent to the excavation. This control should only be used for the shortest practicable period of time.
Personal Protective Equipment - Harmful gases and vapours	Workers must be protected against the effects of toxic or explosive gases that may be encountered or created when working in excavations. Where there is a risk of harmful gases or vapours, workers must work in accordance with this procedure, and KGL Resources Confined Space Procedure.
Personal Protective Equipment	The requirement for specific personal protective equipment (PPE) must be identified during the hazard analysis before commencement of work as detailed in the Excavation Permit.

8. EXCAVATION PERMIT

Work must not commence until an Excavation Permit, has been completed and signed off as part of the authorisation process.

The person issuing the Permit shall:

a. Review the SWMS restrictions and control measures with respect to:

   (i) Minimise the need for people to be in the excavation.

   (ii) Minimise the time an excavation is open (backfilling or closing as soon as possible) to reduce the time the hazard exists.

b. Ensure that if a person is entering an excavation/trench more than 1.5 metres deep it is safe to do so by obtaining in writing approval by a Geo-technical Engineer that engineering controls such as shoring, benching and battering, is sufficient. The approval shall be kept on site at all times.

c. Obtain relevant information about the service (location, type, depth, restrictions to be followed) and record the information.

d. Confirm all documented emergency contingencies are sufficient and ready.

e. Submit documentation including an excavation permit (See JER-8000-MGT-FRM-0037).

9. IMPLEMENTATION OF EXCAVATION WORK

All excavations shall be controlled in accordance with the control measures and contingencies specified in the SWMS such that the excavation will not adversely affect worker safety in the vicinity.

9.1 Inspections

A competent person shall conduct inspections:

a. Before the start of each shift

b. To ensure that the Permit to Work is in place

c. As dictated by the work being performed in the excavation

d. After every rain event

e. After other events that could cause increased hazards, such as windstorm, earthquake, dramatic change in weather, etc.

f. When fissures, tension cracks, sloughing, underground cutting, water seepage, bulging at the bottom, or other similar conditions occur

g. When there is a change in the size, location, or placement of the soil pile

h. When there is an indication of change or movement in adjacent structures

9.2 Monitoring

The Competent Person shall monitor and review the effectiveness of the control measures as the work progresses – either daily or whenever site conditions change or may soon change. If it is identified that conditions could change, new controls should be introduced, or existing controls should be amended, to maintain acceptable low levels of risk.

9.3 Change in Conditions

Any change in work conditions that are potentially hazardous to workers and other stakeholders shall result in a reassessment of the work tasks and area. Changes in work conditions may result in the Permit to Work being suspended or withdrawn and stop work.

Changes in work conditions can include, but are not limited to:

a. Other facility activities being performed
b. Scope of work
c. Weather
d. An emergency situation at the facility

9.4 Stop Work

Where there is a risk to workers due to the instability of the excavation caused by for example:

a. Water seeping from the side, or the base, of the excavation
b. Subsidence
c. Heavy rain
d. Cracks appearing near, and parallel to, the edge of the excavation
e. Excavated or other material being piled beside the excavation,

The Competent Person supervising the work must ensure that the work in the trench stops immediately. Only work necessary to stabilise the excavation shall proceed under the direction of a Competent Person.

In such circumstances work shall not restart, until:

a. All sides of the excavation have been shored, benched or battered.
b. Geo-technical Engineer has inspected the trench and approved, in writing, the excavation/trench as safe to enter.

9.5 Rescue Contingency

Rescue procedures specified in the SWMS shall be executed in the event of an incident which results in the extraction of persons.

It is mandatory that as soon as is practical, an initial incident report is provided to nominated Supervisor or Manager in accordance with the KGL Resources WHS Incident Management Procedure.

10. CLOSE OUT

Sign-off of the permit by an authorised Excavation Permit Issuer shall only occur after all work associated with the excavation has been completed and the site is made safe as declared in writing by a Competent Person.

11. REVIEW AND REVISION OF CONTROL MEASURES

Risk controls must be reviewed on a regular basis to ensure their effectiveness and also to ensure that new risks have not been introduced. A review is required:

- when the control measure is not effective in controlling the risk;

- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the control measure may not effectively control;
- if a new hazard or risk is identified;
- if the results of consultation indicate that a review is necessary; and
- if a health and safety representative requests a review.

12. INFORMATION, INSTRUCTION, TRAINING & SUPERVISION

Managers and supervisors must ensure only workers who have received training and instruction on this procedure can perform Excavation and Trenching Work. This training must include:

- risks of working in or near an Excavation or Trench;
- the content of Excavation Permits;
- control measures specific to Excavation or Trench Work and other potential hazards (for example, piping leading into an Excavation or Trench).
- instruction on the use of PPE and RPE including correct use and maintenance;
- the correct use of tools and equipment in the Excavation or Trench and
- procedures for emergency and rescue.

Managers and supervisors must ensure that workers performing Excavation or Trench Work are adequately supervised by a competent person, especially if they are undergoing training or are unfamiliar with the working environment.

13. INCIDENT REPORTING AND INVESTIGATION

Any incidents arising from fatigue must be reported in accordance with the **KGL Resource Incident Managing Procedure**.

14. BREACH OF THIS PROCEDURE

Workers must comply with this procedure at all times. KGL Resources takes breaches of this procedure very seriously.

If an employee is found to have breached this procedure, they may be subjected to disciplinary action in accordance with KGL Resources' disciplinary processes. Contractors of KGL Resources who are found to have breached this procedure may be the subject of action under their contract with KGL Resources.

15. CONSULTATION

This procedure has been developed and implemented in consultation and co-operation with KGL Resources' workers.

16. RELATED DOCUMENTATION

JER-8000-MGT-PRO-0006	Risk Management
JER-8000-MGT-PRO-0023	Incident Management
JER-8000-MGT-PRO-0036	Competency & Training
JER-8000-MGT-FRM-0037	Excavation Permit

17. MONITORING, EVALUATION AND REVIEW

VERIFICATION	
Monitoring	Compliance with this procedure will be monitored through training and regular audits.
Evaluation & Review	The risk rating is HIGH, reviewed every 1 year. A review will be undertaken sooner if there are changes to legislation, standards and industry codes, or following an SMS review, changes as defined by WHS Regulators, or to ensure continual improvement.
Version Control	Version 1: May 2026

18. APPROVAL

Konrad Litfin

Project Director