



**AZERBAIJAN BUSINESS UNIT
(AzBU)**

**Procedure for:
Excavations**

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1 Introduction

Document Purpose

This document sets out the precautions and conditions considered necessary for the safety of all excavation works carried out on BP owned or managed sites in Azerbaijan and Georgia. It has been produced so that all involved parties can make a uniform approach to excavations.

Document Scope

This document refers to:

- method of excavation
- excavation and protection of third party pipelines and services
- excavation of oil contaminated soils
- backfilling guidelines.

Related Procedures

The following Safe Systems of Work shall be used in conjunction with this document:

- UNIF-HSE-PRO-103 Permit to Work
- UNIF-HSE-PRO-105 Task Risk Assessment
- UNIF-HSE-PRO-107 Energy Isolations-Process
- UNIF-HSE-PRO-108 Confined Space Entry
- UNIF-HSE-PRO-202 Hydrogen Sulphide.

2 Responsibilities

Site Supervisor

- The Site Supervisor is responsible for the safety of all personnel on site and the safe execution of all work carried out on the site
- the implementation of, and compliance with, this Safe System of Work on site
- ensuring that only suitably trained and qualified personnel are employed on site and for using only those contractors who employ suitably competent and experienced personnel
- ensuring that a risk assessment is carried out for the work site by a competent person
- reviewing all Risk Assessments carried out on site
- maintenance of site records including those for Risk Assessments, equipment inspections and training.

Area Authority

Area Authorities are responsible for:

- compliance with this Safe System of Work within their area of authority
- the safety of personnel and the safe execution of activities within their area
- ensuring daily equipment checks are completed on equipment within their area and that equipment is maintained in good working order.

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Machinery Operator

Machinery operators are responsible for:

- the safe and responsible operation of machinery under their control
- immediately reporting to their supervisor if they believe the equipment they are using is in a dangerous or unsafe condition
- ensuring that the machinery or equipment they use has all the safety devices and guards in place and that all guards are properly fitted.

Banksmen

Banksmen are responsible for:

- preventing access to working areas under their control by unauthorised personnel
- providing safe guidance and assisting in the safe operation of machinery under their direction.

All Personnel

All personnel are responsible for:

- carrying out their duties in a safe and responsible manner
- for halting any work where they feel that conditions are unsafe and for bringing this to the attention of their immediate supervisor.

Environmental Adviser

Environmental Advisers are responsible for:

- providing advice and assistance to the Site Supervisor on environmental matters as and when required
- providing Geotechnical Information System information and Global Positioning Survey coordinates regarding natural, archaeological and other important features within and adjacent to the excavation site.

Note: Photographs of important features should also be provided if required.

3 Access Routes

Access routes to proposed sites shall be properly surveyed and reconnoitred. In particular, for all access routes:

- risk assessments shall be made, and actions documented, for all crossing points and other points of difficulty recognised on the route
- method statements shall be produced for negotiating all crossing points and other points of difficulty
- the route shall be clearly marked.

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4 Route Identification and preparation

Locating and Marking Existing Pipelines

Note: At locations where there is hydrocarbon or a suspected leak a gas survey must be carried out before pipeline location activities begin.

Prior to the commencement of any excavation a site survey shall be carried out in order to:

- locate, identify and mark any existing pipelines and foreign services and utilities and any cathodic protection system components, using pipe locating equipment and hand excavated trial holes
- peg out the pipeline routing
- define and log the point of excavation.

Pipeline Crossing Points

Requirements

Construction traffic and other plant shall cross the pipeline only by:

- public roads
- previously agreed and clearly marked crossing lanes or bridges.

Construction

All crossing lanes shall be fenced on both sides over a width to be specified and agreed by the Pipeline Patrolman as far as is reasonably practicable as dictated by local conditions and acts of vandalism. These fences shall be returned along the edge of the wayleave strip for a distance of 6 m away from the crossing.

Where it is necessary at crossing points to install a temporary bridge to protect the pipeline. Such a bridge will consist of the laying of steel plates of adequate thickness with hard core laid in, or an approved sleeper raft, or a combination of these methods. The design and construction of such bridges and crossings shall be by a competent person or approved civil engineering subcontractor where it is deemed necessary.

Markings

Any temporary crossing or bridge, must be clearly marked by appropriate notices and flags, and additionally with lights at dusk, at night or in foggy conditions.

5 Site Safety

Access and Security

Guards and Barricades

Open excavations in a plant or near public areas must be

- attended by a watchman
- or...
- protected by a barricade and mark with a warning sign.

All other open excavations should be attended by a watchman, marked or barricaded. If there is a recognised chance of people or cattle falling into the excavation, a decision may be taken regarding the use of a night watchman.

Note: If a night watchman is used, he shall be equipped with appropriate communications and shelter for use in case of prowling animals, sickness or other emergency. Vehicle for night watchman to be provided as far as is reasonably practicable.

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Fencing, Gates and Safety Notices

Erection of stock fencing, gates and bunting safety notices, etc., shall be undertaken over access ways and worksites.

When the pipeline is exposed outside normal working hours a security presence will be required over and above that of the normal construction personnel. This service shall be supplied by a BP approved Contractor.

Vehicle Traffic

All light vehicles shall be fitted with "DRIVE RIGHT" vehicle monitoring software. Vehicular traffic should not operate within 1 m of a trench or excavation. Vibration created by traffic may cause cave-ins.

Personnel

Warning: Workers **should not** stand on the edge of an excavation or between a pipeline ditch and strung pipe resting on skids. The bank might slough, or temperature changes in the pipe could cause skids to fail and allow the pipe to fall.

Protective Equipment (PPE)

With temperatures experienced in Azerbaijan and Georgia the use of Inherently Fire Resistant or Flame Retardant Coveralls during summer where personnel are working all day outside could be unbearable. An alternative to IFR/FR coveralls for the low flash risk applications is 100% cotton. Personnel involved in specific work activities should wear Flame Retardant coveralls.

During all activities on site all personnel shall wear minimum PPE (helmet, safety boots/shoes, fire coveralls, and eye protection).

Personnel involved in specific work activities shall wear additional PPE to suit the requirements of the work as agreed/detailed at the pre-work toolbox talk.

Excavator Operators

Only experienced operators shall operate the excavating equipment.

Banksmen

Trained and qualified banksmen shall attend all operations involving excavating equipment and movement of heavy plant to prevent personnel entering the field of work and to ensure safe working of the equipment.

Equipment

Type and Location

All equipment shall be checked and registered on the appropriate checklists and registered in accordance with the site operating procedures. All operatives' certificates shall be checked and logged prior to works commencing.

Warning: Machinery vibration may cause cave-in. No running plant shall be located within 1 m of an excavation.

Equipment Inspection

Equipment shall be inspected daily and maintained as necessary to ensure that it is in good working order. This includes the inspection of brakes, pivot pins, hydraulic cylinders, hoses, snap rings, main attaching bolts, etc.

Adjustments and Repairs

- **Do not** lubricate or make mechanical adjustments to the unit while the unit is in motion or the engine is running.
- **Do not** repair or tighten hydraulic hoses or fittings when the:

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- system in under pressure
- engine is running
- or...
- equipment hydraulic cylinders are under a load.

Refuelling

A method statement covering spill containment and management of personnel injury risks shall be prepared for all refuelling operations

In all cases, equipment shall be shut down prior to being refuelled.

Lighting

All lighting shall be either explosion proof or located outside Zone 2.

The Use of Mechanical Equipment Near Overhead Power Lines

Introduction

All personnel working near overhead power lines with a machine or mechanical equipment shall be made aware of:

- the dangers associated with power lines
- the precautions they should follow to deal with those dangers
- what to do if they make contact with a power line.

Warning: Physical contact with high-voltage overhead power lines is likely to be fatal or cause severe and irreversible maiming.
It is impossible to say whether an overhead cable is a power line or a telephone line from observation alone. The only sure method is to make contact with the line owner.

Safe Vertical Working Clearance

The minimum safe working distance between mechanical excavation equipment and live overhead power lines will vary according to:

- type of power line (for example, insulated or uninsulated)
- voltage carried by the power line
- ground and weather conditions.

To establish and maintain safe **vertical** working distances between mechanical equipment and overhead power lines the following practice shall always apply:

1. Establish and record the maximum vertical reach of all machines on site.
2. Identify the routes of all overhead lines on or near the land to be excavated and clearly mark these routes on site plans.
3. For each overhead power line, identify the line owner.
4. From the line owner find out:
 - a. if the line can be conveniently made DEAD
 - b. the line type (for example, insulated or uninsulated)
 - c. the voltage carried
 - d. minimum safe working clearance for mechanical machinery operating near the power line.
5. If the line cannot conveniently be made DEAD then the established minimum safe operating clearance shall be adhered to at all times.

Reducing the Risk from Overhead Power Lines

Risks associated with working close to overhead power lines can be reduced by:

- taking care not to damage poles and stays
- fitting shorter radio aerials or repositioning existing ones on high machines so they cannot cause danger

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- carrying long items (for example, pipes or ladders) horizontally and not storing pipes or other materials and equipment near or under power lines and their supports
- designating safe areas for high-risk activities; for example, tipping trailers
- using barriers and goalposts: by erecting goalposts and barriers, machines which have to pass beneath lines can be limited to a safe height – an option especially suited to gateways and tracks.

If Contact is made With an Overhead Power Line

- Never touch an overhead line – even if it has been brought down by machinery, or has fallen through other means.
- Never assume that lines are dead.
- When a machine is in contact with an overhead line, electrocution is possible if anyone touches both the machine and the ground. Stay in the machine and lower any raised parts that are in contact or drive the machines out of the lines if you can.
- If you need to get out to summon help or because of fire, jump out as far as you can without touching any wires or the machine – keep upright and away from the machine.
- Get the line owners to disconnect the power supply. Even if the line appears dead, do not touch it – automatic switching may reconnect the power.

Working Hours

Excavation work shall only be carried out during daylight hours where practicable. If the task overruns dayshift then the area will be barriered off and illuminated using approved out side site lighting. Preferably this should be a mobile tower, diesel driven arc light if available. These are additional requirements in addition to the site being fenced off.

Fires

Storage of material for lighting of fires within the pipeline wayleave or in the vicinity of above ground installations associated with it **is not** permitted.

6 Pre-excavation requirements and Procedure

Note: Excavation activity should preferably be undertaken in the summer as far as is reasonably practicable, in order to minimise both ground disturbance and soil compaction.

BP Consent

Excavations may only take place on BP managed or owned property with formal consent from BP, with 72 hours notice as far as is reasonably practicable. Where excavation is to take place, a Permit to Work and an Excavation Certificate shall be obtained before work begins.

Landowners

Ensure that access has been granted by the landowner, that a pre-entry survey with photographs has been done and that compensation, access route and area protection have also been agreed.

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Landowners and neighbours in close proximity to the proposed excavation must be informed that work is about to begin and that the inspection is of a routine nature.

Note: This requirement may be negated under an emergency situation.

Third Party Services

Owners of third party services shall be contacted before the excavation of their services begins. A No Objection Certificate shall be obtained when applicable.

Excavation Boundaries

The extent of required excavation shall be clearly marked out prior to commencement of the work.

Drainage Patterns

Prior to excavation, existing drainage patterns should be noted, so that subsequent drainage schemes can mimic the original pattern (see *9.1 Drainage*).

Excavation design requirements

Access

Whenever personnel will be in an excavation, ramps, stairways or ladders should be kept within 7.6m of workers for all excavations over 1.2m deep.

A ladder, stairway or ramp shall be installed on both sides of the pipeline to provide ingress and egress for workers.

Windsocks

Wherever the presence of hydrocarbons is reasonably suspected, for example in all Red Zones, windsocks or flags must be positioned on both sides of the excavation in order to determine wind direction.

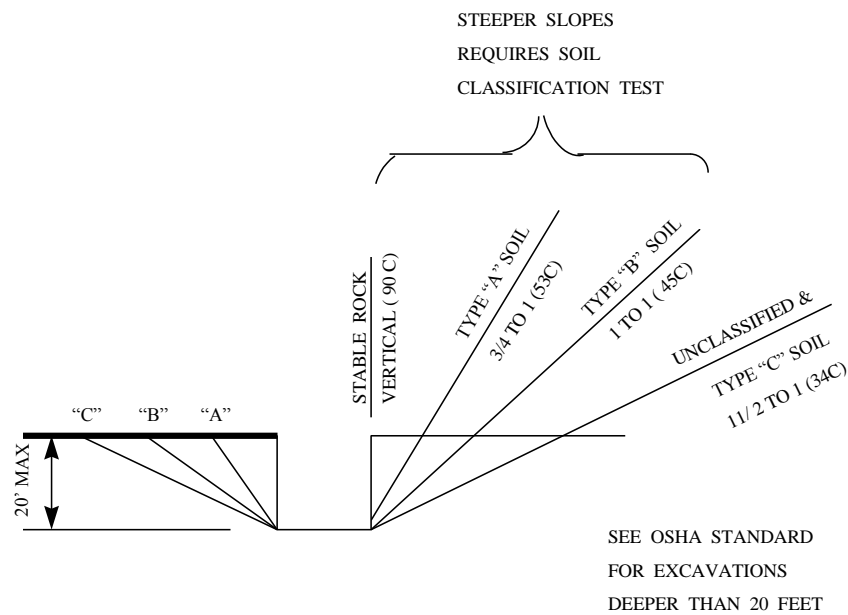
Slope Requirements and Ground Type

Excavations deeper than 1m shall have the sides benched or battered back, as per *Figure 1 Minimum Acceptable Excavation Design Profiles for battered profile or figure 2 for benched profile*. Shoring shall be used when required and site specific drawings, for approval by BP, shall be prepared.

Except in stable rock, all excavations must be shored, shielded (i.e., trench box), benched or sloped if:

- the excavation is 1.2m or more in depth
- a worker's head is below the level of the excavation when bending or stooping to perform the work task - as far as is reasonably practicable and/or required by Risk Assessment.

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Note: 20 feet = 6.1m

Figure 1 Minimum Acceptable Excavation Design Profiles

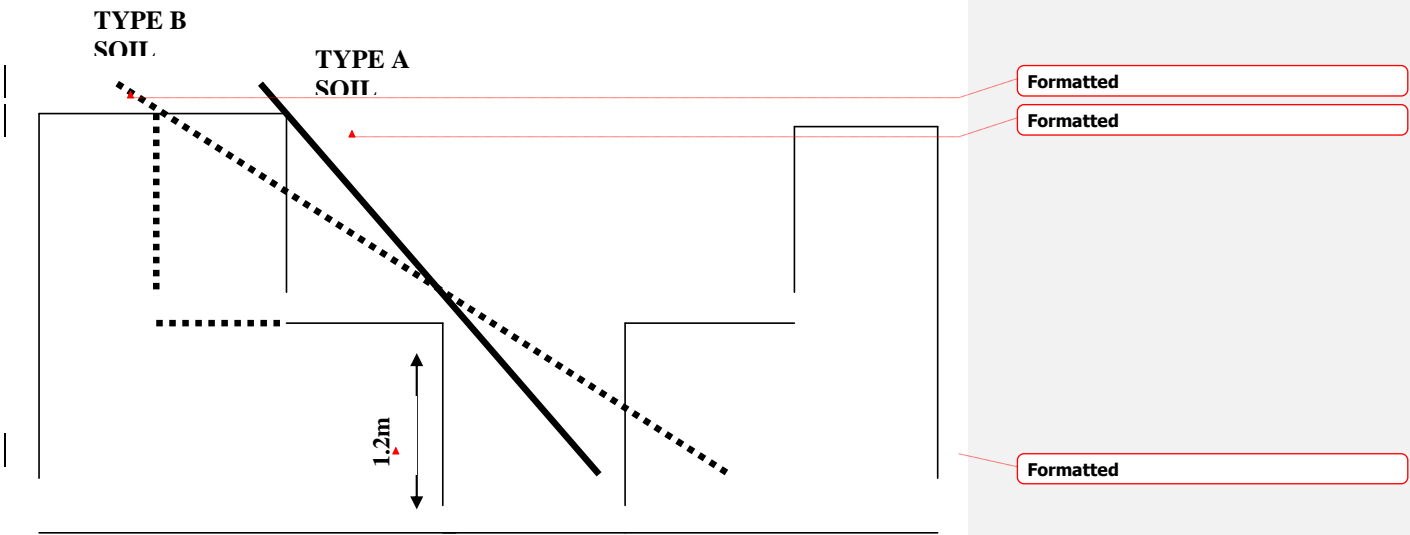


Figure 2 Benched Excavation

The following table describes the soil types and minimum acceptable slope requirements for excavations.

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Note: Soil type must be determined by visual and manual tests; otherwise, assume Type C soil with 1 ½ to 1 slopes.

Soil Type	Description	Maximum Slope (Horizontal to Vertical)
Solid rock	N/A	Vertical (90°)
A	Strong soils, compressive strength greater than 144kPa, clay or clay soils, hardpan, caliche.	¾ to 1 (53°)
B	Medium soils, strength > 48kPa, but <144kPa angular gravels, silty soils, Type A soil that has been disturbed, subjected to vibration or is fissured.	1 to 1 (45°)
C	Weak soils, strength < or = 48kPa gravel, sand, wet (seeping or submerged) soil.	1 ½ to 1 (34°)

Planning for Water Accumulation

Works shall be suspended / re-scheduled during periods of severe/inclement weather. A portable diesel driven dewatering pump with a suitable length of hose shall be in attendance to drain the excavation if required.

When someone will be working in an excavation where water may accumulate, consideration **should** be given to:

- special support or shield systems
- water removal equipment, and
- emergency rescue procedures.

Confined Spaces

If the depth of excavation is 1.2m or greater, it shall be treated as a confined space. Risk Assessment should stipulate if all confined space entry requirements are to be met. Gas testing must be carried out prior to entry. Where hazardous atmospheric conditions may exist or develop in an excavation/confined space, controls such as proper respiratory protection (BA sets, respirators), ventilation, availability of trained and competent Rescue Teams and Emergency Rescue equipment must be provided.

Risk Assessment, Permit to Work and Supplementary Certificates All Excavation Work

All works shall be:

- preceded by a Risk Assessment – could be based on generic RA but should be reviewed or updated if conditions changed by responsible persons prior to work commencing.
- carried out under a Permit to Work, supported where necessary by:
 - Isolation Confirmation Certificate, if applicable
 - Clearance for Excavation Certificate
 - An application to perform lifting operations/Clearance to Move Heavy Equipment Certificate, if applicable
 - Confined Space Entry Certificate, if excavation defined as confined space
 - Cold Work Special Task Permit.

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- implemented by competent and suitably qualified personnel under control of a Site Supervisor or his appointed nominee.

Permit Requirements

Prior to permit issue, the following must be ascertained:

- All Isolation Confirmation Certificates (ICC's) for the pipeline have been checked and validated, if applicable.
- The landowner has granted right of access.
- The Task Risk Assessment has been carried out (in particular, all power, pilot or tracer cables that are within the excavation zone, overhead and below ground, must be located and identified).
- The Task Workpack, if applicable, are approved and onsite.

In addition, the procedures listed in *1.3 Related Procedures* should be consulted wherever there is a potential for:

- possible energy release
- the presence of hydrogen sulphide or hydrocarbon gas
- an oxygen deficient environment
- the presence of carbon dioxide or other chemical substances.

Environmental Impact Assessment

For new excavations in areas not previously excavated or areas containing refurbished sections of the old GIOC pipeline, before any excavation (mechanical or non-mechanical) may begin, an Environmental Impact Assessment must be conducted to establish whether or not the area of excavation is of ecological or archaeological importance. An Environmental Impact Assessment Report / Letter (based on the findings of the assessment) shall be sent to the State Committee of Ecology (SCE) for approval. Only when this report / letter has been approved can excavation commence, and even then, only in accordance with any requirements specified by the SCE.

Note: Protection of Historical and Cultural Monuments shall be implemented in accordance with the EMS Manual and Procedure No. EP - 003

Site Supervisor – Assessment Responsibilities

The Site Supervisor shall review archaeological maps, ensure that the Environmental Adviser is notified of any scheduled ground disturbance (inside and outside the right-of-way) and shall ensure all relevant personnel are made aware of the resulting Environmental Assessment.

Environmental Adviser – Assessment Responsibilities

Upon notification of the intended excavation, the Environmental Adviser shall:

- provide the Site Supervisor with GIS information regarding natural and archaeological features on the site
- provide the Site Supervisor with GPS coordinates and photographs of any important features
- conduct a presentation identifying relevant natural and archaeological features on the site. Attendees for the presentation shall include the Site Supervisor and machinery / excavator operators.

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7 Excavation Procedures

Note: No excavation shall be performed:

- without a BP representative being on site as far as is reasonably practicable
- until adequate communications with management and/or the emergency response team are assured (the communications protocol to be adopted shall be included in the Emergency Response Bridging Document) and/or in the relevant operations procedures).

Note: No mechanical excavation shall take place closer than 1m to any existing live pipelines, cables, services, that belong to other parties. Use of mechanical excavation to within 1m is subject to said pipelines, cables or services being identified, located and suitably protected.

Excavation Inspections

Where personnel are required to work in excavations of 1.2m or deeper a safety inspection by a competent person must be carried out on each shift as follows:

- before work is started
- after rainstorms
- after other occurrences which may increase the hazard of cave-ins.

All high-risk excavations as defined by the Risk Assessment must be attended by a geo-technical engineer/person trained in soil analysis.

Toolbox Talks

A toolbox talk shall be carried out prior to works commencing with all parties involved in the works. Talks shall be carried out during the works when the initial shift handover takes place and when new works come on site.

Note: Toolbox talks shall be recorded.

Non-Mechanical Excavation

Once the position of the pipeline has been found, mechanical excavation may proceed down to 500mm from the top of the pipe, leaving the remainder to be removed by hand. This also applies to each side of the pipe except that the last 1000mm is to be removed by hand. Machine excavation down to a depth of 500mm to top of pipe is only allowed if combined with hand excavation as follows:

- ♦ Hand excavate a slit trench across the intended excavation up to a depth of 300mm
- ♦ Probe the hand excavated area to confirm the pipeline is at 500mm or greater depth
- ♦ Machine excavate the remaining area to a depth not exceeding the depth of the hand excavation
- ♦ Hand excavate a slit trench as above, probe and the if pipe cover below depth of hand excavation is greater than 500mm again machine excavate the remaining area to a depth not exceeding the depth of the hand excavation
- ♦ Repeat the above until a cover of 500mm over the pipeline remains. This shall then be remove by hand excavation only.

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Note: An entry certificate will be required for work in an excavation that is deeper than 1.2m.

Note: Excavator buckets **shall not** be fitted with teeth during excavations in the vicinity of pipelines or any other service.

Soil below the pipeline shall be removed by hand to the side of the excavations where it can be mechanically removed.

If the pipeline at any time is exposed by excavation, it shall be properly supported and protected against damage to the satisfaction of the Area Authority or BP representative. On completion, permanent support shall, if necessary, be constructed to avoid future settlement.

Temporary supports shall be installed under exposed services, where required and the Contractor shall submit a sketch of proposed support for approval prior to excavating.

To avoid damage during work, any exposed part of the pipeline shall be protected by cladding (for example, timber) as directed by the Area Authority/BP representative and any damage to the protective wrap/coating of the pipeline, whether existing or caused by excavation work, etc., shall be brought to his notice.

Mechanical Excavation

Before machine excavation begins

- Pipelines, **should** be depressurised as far as is reasonably practicable, and
- hand digging **should** be completed around pipelines, utilities, and cathodic protection system components.

Note: Use caution when excavating around live lines and / or lines that may be severely corroded.

Note: Excavator buckets **shall not** be fitted with teeth during excavations in the vicinity of pipelines or any other service.

Operating restrictions

The following are operating restrictions for excavating equipment.

- Tracked vehicles **should be used in preference** to wheeled equipment on the side of the excavation to minimise soil compaction.
- Equipment **must** be operated within its rated capacity.
- Personnel **must** stay clear of excavating equipment while in operation. Examples of unsafe areas include: under or beside the bucket of a backhoe, near hydraulic rams of a bulldozer, etc.
- Roll Over Protective Structure (ROPS) is required by PUWER 98 to be fitted on any mobile equipment as far as is reasonably practicable. Decision whether or not ROPS is required, is based on pre-job Risk Assessment and exemptions from this rule are as follows:
 - The ROPS would increase the overall risk to safety
 - It is not reasonably practicable to operate the mobile work equipment with such a device fitted
 - If mobile equipment was purchased for use in the business before 5 December 1998.
- A seat belt **must** be installed on equipment manufactured with a ROPS.
- Do **not** use equipment if the ROPS has been removed.

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Note: “Pure” ditching machines (those without blades or backhoe attachments) are excluded from ROPS requirements.

Operators

Equipment operators must:

- be trained in the use of the equipment
- be properly seated when operating equipment controls
- wear seat belts if the equipment is in operation and furnished from the manufacturer with a Roll Over Protective Structure (ROPS)

Note: Seat belts **should not** be worn if the equipment is not fitted with a ROPS.

- use care at all times to maintain equipment stability
- always drive at safe speeds for the conditions encountered (for example, on rough ground, slopes, crossing ditches, turning, etc)
- always use steps and handles provided when mounting or dismounting equipment.

Equipment operators must not:

- start the engine unless seated in the driver's seat
- allow other personnel to ride on the equipment unless it is designated for more than one occupant
- get off the equipment while it is in motion, except in an emergency.

Parking and Moving Equipment

The table below describes the operator requirements for specific excavating equipment.

Activity	Precautions
Parking excavating equipment	<ul style="list-style-type: none"> • Park the unit on the level ground if possible and... • Lower the boom to a relaxed position
Parking a backhoe on an incline	<ul style="list-style-type: none"> • Lower the bucket so that the cutting lip contacts the ground • Apply the parking brake and... • Securely chock the wheels.
Loading equipment on a trailer	<ul style="list-style-type: none"> • Use the crawl gear.
Storing or transporting a ditcher on a trailer	<ul style="list-style-type: none"> • Use trainer ramps • Lower the boom • Place the transmission in gear and... • Fasten the ditcher securely to the trailer.

Using Backhoes

The following precautions apply whenever a backhoe is used during excavation:

- Personnel **must not** be in an excavation within the full reach of the backhoe while it is excavating
- The boom must be raised and centred before engaging or disengaging the transport.

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- Avoid using the full reach or swinging a loaded bucket to the downhill side.

Note: This will prevent upsets when operating in a slope.

- Attach towlines at a point below the rear axle.

Note: Attaching above this level increases the risk of rollover.

Waste Management

Waste management on the excavation site shall be implemented according to the EMS Manual and Procedure No. EP 80.

Power Lines

Before operating equipment, all utility lines and overhead power lines must be located and identified.

Note: See 4.5 *The Use of Mechanical Equipment Near Overhead Power Lines*.

Hydrocarbon Pipelines

Mechanized excavation in close proximity to hydrocarbon lines poses an increased risk of fire/explosion in the event of hydrocarbon release.

Note: Mechanical excavation shall not occur within 15.2m of an open flame, such as a flare, an equipment burner without a flame arrester, cutting torch, etc.

Excavated Materials

Excavated material shall be placed at least 1m away from the edge of the excavation and shall be stockpiled within the Right of Way area.

Topsoil

The stripped topsoil shall be stored for re-use away from the side of the excavation and separate from the sub-soil.

The height of stored soils should be limited to 2m in order to reduce erosion problems and prevent the development of anaerobic conditions within the stockpile. Weed growth may need to be controlled by spraying with approved herbicides.

Warning: Do not pile topsoil under overhead power lines.

Subsoil

The stripped sub-soil shall be stored for re-use away from the side of the excavation and separate from the topsoil.

Warning: Do not pile subsoil under overhead power lines.

Contaminated Soil

Note: Any excavation where contaminated ground is encountered shall have a Hazard Risk Assessment completed. This Risk Assessment shall take into consideration the duration that the excavation is expected to be open.

All excavations in contaminated ground conditions will be bounded to prevent the ingress of surface water and shall be monitored on a regular basis for any change in the level of the ground water or liquid level (particularly in the event of heavy rainfall). Monitoring shall be on a 24hour basis in high-risk areas as determined by the Hazard Risk Assessment.

Excavated contaminated soil shall be placed into a bounded area lined with heavy – duty plastic sheeting to avoid seepage and shall be segregated from uncontaminated soil.

All excavated soil grossly contaminated with hydrocarbons and not re-used shall be transported to a designated treatment facility approved by BP.

Where work in an area of contaminated ground cannot proceed in accordance with the schedule, consideration will be given to back-filling the excavation

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8 Backfilling Procedures

Preparation

Notice, Approval and Supervision

Adequate notice shall be given to BP of the intention to backfill within the wayleave of the pipeline.

In addition, backfilling of the trench shall not commence without the approval of the Site Team Leader or the Area Authority/BP representative and shall only proceed in the presence of the Area Authority/BP representative. The Area Authority/BP representative shall advise on the specification of the backfill and the method of consolidation around the pipeline.

Backfill Materials

No perishable materials such as vegetable growth, timber bush, etc are to be filled into the trench.

Special care must be taken to prevent any stones, cinders, slag, debris of made up ground or other harmful matter such as will be likely to set up corrosion from coming into contact with the pipe.

Stony or gravelly trenches are frequently a problem at river crossings and old riverbeds. If rock, stones or gravel are present in the bottom of the trench then fine material is first placed above the pipeline to ensure that only fine material surrounds the pipe.

Backfilling Guidelines

Backfilling operations in well-compacted layers should be carried out in such a manner as to prevent heavy loads passing over the pipeline. Allowance should be made for sufficient overfilling or mounding of the filled trench to compensate for subsequent settlement.

The following guidelines apply to backfilling operations:

Note: If a compactor is used, area gas monitoring shall be conducted throughout the compacting activity

1. All water shall be removed from the trench before backfilling commences.
2. The bottom of the trench shall be padded as far as is reasonably practicable with a minimum of 150mm of suitable granular material, i.e., building sand, to be approved by the Area Authority/BP representative, free from hard objects which might damage the pipe coating. This padding shall be compacted in layers of 150mm.

Note: The removal of any fine materials from riverbanks and / or riverbeds is strictly prohibited.

3. Before backfilling, it must be checked that the pipe is evenly bedded on the trench padding throughout its length.
4. Imported granular or selected excavated materials, i.e., building sand, shall then be rammed at sides (150mm) and around the pipe until 300mm of cover over the top of the pipe has been hand rammed.
5. The original topsoil is to be replaced in the top of the trench with the same depth as that on the working width.
6. All surplus excavated materials, rock, welding rods, waste and all unwanted material shall be removed from the site of the works and the site left in a tidy condition.
7. The backfill can be compacted if deemed necessary using a diesel driven plate compactor but must not be used on the top or sides of the pipeline.

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8. On completion of backfilling all fields, verges, tracks, paths, garage drives and access roads should be permanently reinstated to a condition equivalent to that before the commencement of the work.
9. Any damage to field drains etc must be repaired and local farmer/land owner be invited to inspect the repair(s) prior to backfill.

9 Site Reinstatement

Reinstatement of the site shall be implemented in accordance with the EMS Manual and Procedure No. EP-100.

Drainage

Any field drains that have been damaged should be repaired or replaced. Drainage patterns should be returned to their original state (see 5.5 *Drainage Patterns*) by using the same permeable materials that were excavated. Topsoil reinstatement should take place in dry conditions to prevent permeability and drainage characteristics from being altered through compaction.

Topography

In addition, excavated soils should be redistributed across the entire right-of-way to restore the natural topography. Any areas outside the trench area that have been compacted by moving vehicles should be loosened using deep-tine cultivators. The responsible department in order to ensure that restoration is satisfactory or to ensure that monitoring should continue should carry out a final inspection.

10 Documentation

The following documentation and information must be maintained and readily available:

- Risk Assessments
- [Tr@ction](#) electronic database
- Permits and Supplementary Certificates
- Equipment inspection reports
- Operator certificates
- Notices to 3rd parties
- Notices received
- Excavation Report

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Appendix A – List of Abbreviations and Definitions

Competent Person	A person trained in soil analysis (as far as is reasonably practicable), the use of protective systems, and hazardous atmospheric conditions who has the authorization to take prompt corrective measures to eliminate hazards
Excavation	Any man-made cut, cavity, trench or depression in an earth surface formed by earth removal. Examples include ditch, trench, bell hole, etc
GIS	Geotechnical Information System
GPS	Global Positioning System
Isolation	A method of preventing the passage of fluids through connecting pipe work and the disconnection of all forms of motive power in order to allow safe access to allow intrusive equipment maintenance.
ROW	Right of Way
Way leave strip	The strip of land through which BP has acquired the right to lay, construct and maintain a pipeline.

Appendix B – Emergency Procedure in the Event of Damage to Pipeline

SAFETY PROCEDURE IN CASE OF DAMAGE TO A PIPELINE

Should the pipeline be damaged, the following steps shall be taken:

- a) Shutdown all running plant and ensure that all other sources of ignition are removed.
- b) Remove all personnel from immediate vicinity.
- c) Prevent the approach of traffic or any unauthorised persons.