Procedure for Excavations and Trenches

AZSPU-HSSE-DOC-00050-2

Authority:	Offshore Health & Safety Manager - Yuliy Zaytsev	**Custodian:**	CoW/Safety Systems Lead - Elman Shikhkerimov
Scope:	AzRPU	**Document Administrator:**	HSE Document Coordinator
Issue Date:	22 October 2004	**Issuing Dept:**	AzSPU Health & Safety Offshore, HSE & Engineering
Revision Date:	22 January 2011	**Control Tier:**	2
Next Review Date:	22 January 2013		

TABLE OF CONTENTS

1 INTRODUCTION

Purpose/Scope

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.

The contents of this procedure are applicable to all BP owned and managed sites / installations in Azerbaijan and Georgia. Contractors working on BP owned or managed sites / installations are also responsible for alignment with this procedure.

This document does not replace the procedures prepared and adopted by specialist contractors. Neither does it supersede any national and local regulatory requirements.

This procedure contributes to compliance with BP Group Defined Practice for Control of Work requirements that the Hazards associated with BP activities are identified and that the risks are assessed and managed.

All guidelines contained shall be regarded as the minimum requirements for BP owned or managed sites / installations in Azerbaijan and Georgia.

The scope covers defined activities of BP and Contractors at all BP AzSPU sites and installations.

This document refers to:

- Method of excavation
- Excavation and protection of all pipelines and services
- Excavation of oil contaminated soils
- Backfilling guidelines

2 DEFINITIONS & ABBREVIATIONS

RoW	Right of Way
GIS	Geotechnical Information System

GPS	Global Positioning System
SM	Site Manager
SC	Site Controller
AA	Area Authority
PA	Performing Authority
ALARP	As Low as Reasonably Practicable
COW	Control of Work
CSE	Confined Space Entry
ICC	Isolation Control Certificate
L2RA	Level 2 Risk Assessment
PTW	Permit to Work
RTC	Risk It, Talk It, Check It Pre-Task Risk Assessment
SSOW	Safe System of Work
TRA	Task Risk Assessment
TA	Technical Authority
TBT	Toolbox Talk
ROPS	Roll Over Protective Structure
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 ditches, trenches, bell holes, etc
Way Leave Strip	The strip of land through which BP has acquired the right to lay, construct and maintain a pipeline
Hazardous area	Area where presence of hydrocarbons/toxic gases is possible
GDP	Group Defined Practice
RPU	Regional Production Unit

3 GENERAL REQUIREMENTS

Legislation & Standards

- Operating Management System OMS Essentials 3.2(3.2.1) and 4.5(4.5.1)
- BP Group Defined Practice for Control of Work GDP 4.5-0001(Appendix 1)

The aim of this Safe System of Work is to achieve ”no accidents”, “no harm to people” and “no damage to the environment”. To achieve this aim, this SSOW complies with National Legislation, the terms of the Production Sharing Agreement (PSA) and mandatory BP Standards.

The best International Oil Industry practice and relevant goal setting legislation have been adopted to reduce the level of risk to as low as reasonably practicable and therefore well below that mandated by applicable statutory laws and regulations.

In the absence of local regulations, BP Group Standards will apply. In addition, appropriate UK and US regulations and industry best practice have been considered in setting suitable goals and targets.

Ground Disturbance- Requirement associated with Control of Work GDP

Work that involves a manmade cut, cavity, trench or depression formed by earth removal, or driving of piles into the earth’s surface cannot proceed unless:

- A hazard assessment of the work site is completed by competent person(s)
- All underground hazards, i.e., pipelines, electric cables, etc., have been identified, located and if necessary, isolated
- A permit has been issued
- Ground movement shall be controlled and collapse prevented by systematically shoring, sloping, benching, etc., as appropriate
- Ground and environmental conditions shall be continuously monitored for change
- Unauthorized access is prevented

Where persons are to enter an excavation:

- A confined space entry permit must be issued if the entry meets the confined space definition (deeper than 1.2 m etc., ref. AzSPU-HSSE-DOC-00013-2)

Company Requirements

It is a company requirement that all tasks are subjected to an assessment of risk to demonstrate that risks have been reduced to as low a level as reasonably practicable (ALARP). This can be achieved by complying with the Company's existing standards. Where compliance with Company standards cannot reasonably be achieved, a formal level 2 Risk Assessment will be undertaken to identify any additional controls and demonstrate that risks remain as low as reasonably practicable.

Stopping Unsafe Work

To stop the continuation of potentially unsafe work at the earliest possible stage, the Control of Work (CoW) Policy incorporated into relevant procedure and this procedure for Excavations make it very clear that all personnel are obliged and have the authority to **"STOP"** the work that they consider to be unsafe.

Due to the various languages spoken at sites / installations, there is a necessity to assist all with "an ease of understanding".

4 KEY RESPONSIBILITIES

Site Manager (SM) / Site Controller (SC)

The Site Manager / Site Controller shall be responsible and accountable for the application of this procedure in his area of responsibility, He shall ensure:

- That this procedure is strictly adhered to for all work activities that involve open excavations in the earth's surface
- That only certified and experienced operators operate excavating equipment
- That all work activities that involve open excavations in the earth's surface are subject to risk assessment and the Project Permit to Work System
- That all work activities that involve open excavations in the earth's surface are closely monitored to ensure compliance with this procedure
- That suitably qualified and experienced personnel are appointed to control and perform all work activities that involve open excavations in the earth's surface

Area Authority (AA)

Area Authorities are responsible for:

- Compliance with this Safe System of Work within their area of authority
- Determination of the RA level

- The safety of personnel and the safe execution of activities within their area
- Ensuring daily equipment checks are completed on equipment within their area by the Machinery Operator and that equipment is maintained in good working order
- Ensuring that all excavations are conducted in accordance with this procedure and BP Group Defined Practice for Control of Work (ground disturbance)
- Pre-task worksite inspection prior to issuing a PTW to ensure all required safety controls are in place
- Carrying out inspection upon completion of work
- Provision of instruction to personnel as required
- Monitoring work activities to ensure compliance with the requirements of safe systems of work

Performing Authority (PA)

Performing Authorities are responsible for:

- Complying with the requirements of this procedure during the performance of all the excavation work or preparing and submitting to the Area Authority, for review and approval, their own Excavation procedure to cover the work
- Ensuring that only suitably trained persons are assigned to excavating and trenching activities in their area of operation
- Ensuring that all workers under their control understand the specific excavation safeguards and comply with this procedure and any other BP standard, local regulation ands applicable safety rules, standards, and procedures during excavation and trenching operations
- Conducting a recorded pre-task TBT to discuss in detail task related hazards, proper task execution and required safety controls.

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.
- Ensuring daily recorded equipment checks are completed on equipment within their area and that equipment is maintained in good working order

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
- Remain in communication with the rigger/slinger and crane operator at all times.
- Be known and clearly identifiable to all concerned by wearing high visibility identification

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.

5 EXCAVATIONS AND TRENCHES DEEPER THAN 1.2m

All excavations and trenches deeper than 1.2 metres in “hazardous areas” as defined by the site / installation are classified as confined spaces.

In “non hazardous areas” where there are no significant hazards identified prior to entry, the following criteria must be established before determining the requirement for a “Confined Space Entry permit”:

- No risk of atmospeheric hazards either from surrounding area or from the task being performed.
- The excavation does not require any form of isolation prior to entry.
- No risk of engulfment from Ingress of solids or liquids.
- No risk from excessive heat.
- Unrestricted safe means of access and egress for work party
- Unrestricted safe means of aceess and egress for rescue purposes
- Excavations benched or shored to reduce risk of collapse
- Continuous monitoring of O2, LEL and other toxic gasses are carried out inside the excavation

The excavation / trench may be classified as **“not a confined space”** if all the above criteria can be established and a Level 2 Risk Assessment is conducted.

Note: A Permit to Work and Level 2 Risk Assessment are mandatory for **“all work”** in excavations and trenches deeper than 1.2m.

5.1 ACCESS ROUTES

Access routes to proposed sites shall be properly surveyed and, 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

5.2 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 way-leave 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, the bridge will be of engineered design and approved by the Site Manager or Site Controller. The design and construction of such bridges and crossings shall be made 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.

5.3 SITE SAFETY

Access and Security

Guards and Barricades

Open pit**s**/excavation**s** shall be protected by hard barriers (jersey plastic, iron etc.). Open excavations near public areas must be attended by a watchman and marked with a warning sign.

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.

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

Vehicular traffic should not operate within 1.5 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 near live hydrocarbon lines 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.

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. They have to comply both with BP and local legislative requirements where applicable. In addition all plant mobile equipment (such as cranes, forklifts, cherry pickers etc.) drivers shall obtain license from state authority.

Warning: Machinery vibration may cause cave-in. No running plant shall be located within 1.5 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:

- System in under pressure
- Engine is running
- 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 refueling operations. In all cases, equipment shall be shut down prior to being refueled.

Lighting

All lighting shall be either explosion proof or located outside Zone 2, if there is a potential for presence of hydrocarbons.

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
- As a minimum one team member has to be trained as an Advanced First Aider

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.

Note: Further guidance on safe working in the vicinity of over head power lines can be gained from HSE note GS 6; Avoidance of Danger from Overhead Electric Power Lines.

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 un-insulated)
- 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 and establish clear communication route, including for emergency situations.
4. From the line owner find out:
   a. If the line can be conveniently made DEAD

b. The line type (for example, insulated or un-insulated)
c. The voltage carried
d. The 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
- 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 adequately 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 way-leave or in the vicinity of above ground installations associated with it **is not** permitted.

5.4 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.

Requirements on Excavation Certificate are stated in the Procedure for Permit to Work (AZSPU-HSSE-DOC-00060-2)

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.

Landowners and neighbors 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.

All PTW for excavations shall include a drawing of sufficient scale to clearly define the excavation boundaries.

Drainage Patterns

Prior to excavation, existing drainage patterns should be noted, so that subsequent drainage schemes can mimic the original pattern (see 5.7 *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

In hazardous areas, windsocks or flags must be positioned on both sides of the excavation in order to determine wind direction.

Portable Gas Detectors

Portable gas detectors are to be used in hazardous areas and they are to be sited up-wind of the excavation. Care is to be taken as to ensure the work party are in audible range of the detector. The detectors are to be checked and monitored regularly. It may also be necessary to supply the work party inside the excavation an additional gas detector.

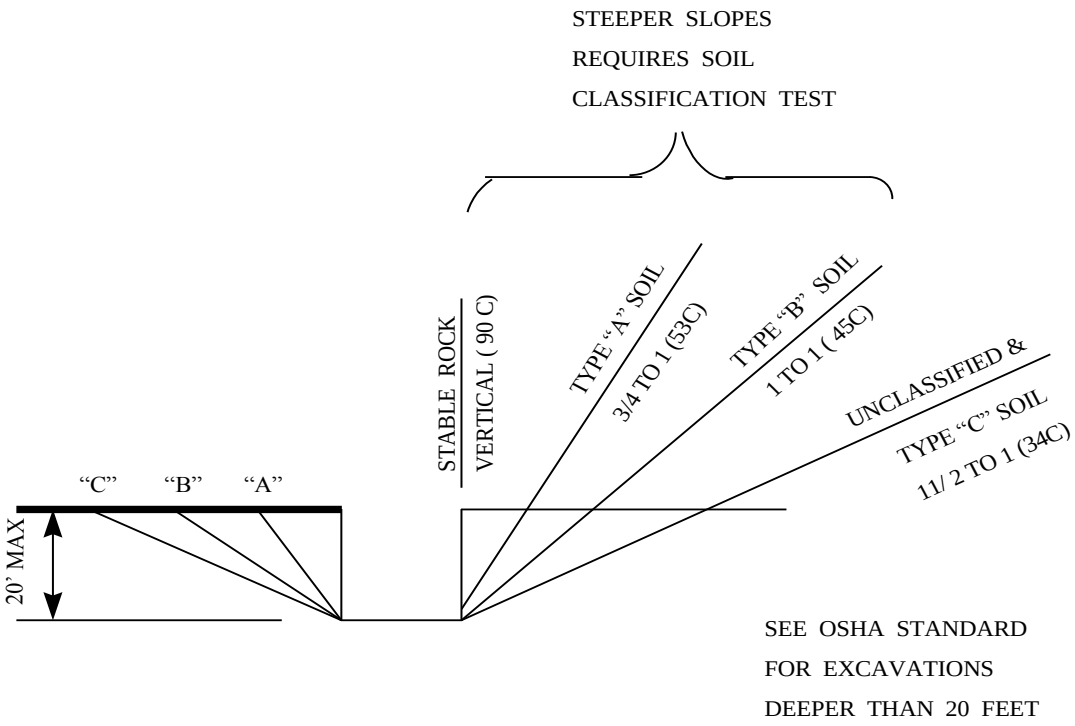
Slope Requirements and Ground Type

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.

Excavations deeper then 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.



Note: 20 feet = 6.1m

Figure 1 Minimum Acceptable Excavation Design Profiles

TYPE A	**TYPE B**
SOIL	**SOIL**
53°	**45°**

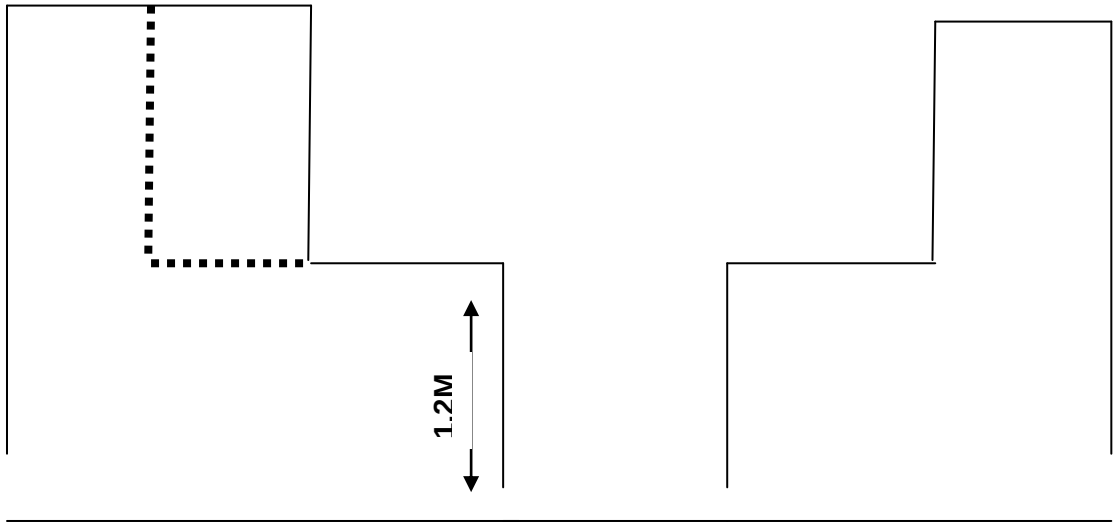


Figure 2 Benched Excavation

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

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

Risk Assessment, Permit to Work and Supplementary Certificates

All Excavation Work

All works shall be:

- Preceded by a Risk Assessment
- 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
- 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 excavation have been checked and validated, if applicable.
- All P&ID, site underground lay out drawings should be reviewed
- 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 Work-pack, if applicable, are approved and onsite

In addition, the procedures listed in Section 6 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 monoxide 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 Manager / Site Controller 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 Area Authority / Performing Authority / Supervisor and machinery / excavator operators

5.5 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 than1m to any existing live pipelines, cables, services and services. 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 severe weather conditions or seismic activity
- 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 removed by hand excavation only

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

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

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 certified to operate the equipment to satisfy the BP and local legislative requirements where applicable
- 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)
- 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
- Leave the equipment with running engine unattended

Parking and Moving Equipment

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

Activity	Precautions
Parking excavating equipment	• Park the unit on level ground if possible and lower the boom to a relaxed position
Parking a backhoe on an incline	• Lower the bucket so that the cutting blade contacts the ground, then apply the parking brake and securely chock the wheels.
Loading equipment on a trailer	• Use crawl gear.
Storing or transporting a ditcher on a trailer	• 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.

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

Note: This will prevent upsets when operating on 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 Task 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 bunded 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

5.6 BACKFILLING PROCEDURE

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 which will be likely to set up corrosion from coming into contact with the pipe.

Stony or gravely 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 below the pipeline to ensure that only fine material surrounds the pipe.

Backfilling Guidelines

Backfilling operations should be carried out in well-compacted layers to protect pipeline from heavy loads passing over. 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 compacter. Care must be taken not to damage pipelines
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.

5.7 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 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.

5.8 DOCUMENTATION

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

- Risk Assessments
- Permits and Supplementary Certificates
- Equipment inspection reports
- Operator certificates
- Notices to 3rd parties

- Notices received
- Excavation Report

6. KEY DOCUMENTS / TOOLS / REFERENCES

This Procedure for Excavation shall, where appropriate, be used in conjunction with this suite of BP AzSPU SSOW Procedures referenced below.

Document Number	Title of Procedure
AZSPU-HSSE-DOC-00088-2	CoW Training Policy
AZSPU-HSSE-DOC-00012-2	Procedure for Authorisation
AZSPU-HSSE-DOC-00063-2	Procedure for Task Risk Assessment
AZSPU-HSSE-DOC-00048-2	Procedure for Energy Isolation-Electrical
AZSPU-HSSE-DOC-00049-2	Procedure for Energy Isolation-Process
AZSPU-HSSE-DOC-00013-2	Procedure for Confined Space Entry
AZSPU-HSSE-DOC-00054-2	Procedure for Incident Investigation and Reporting
AZSPU-HSSE-DOC-00015-2	Procedure for Control of Inhibits & Overrides.
AzSPU-HSSE-DOC-00060-2	Procedure for Permit to Work
AZSPU-HSSE-DOC- 00002-2	Procedure for Control of Work

APPENDIX A: EXCAVATION SUPERVISOR COMPETENCY CHECKLIST

Full Name: _____	**Company** _____	**Department** _____	**Date** _____/_____/_____

ES Competency Assessment Criteria

The individual should have satisfactorily completed the following SSoW Mandatory Trainings (Classroom based or CBT), before the assessment

	Initial Training Details		Refresher Training Details	
1	Course Title	Date *at least 6 month prior to expiration*	Course Title	Date *at least 6 month prior to expiration*
	Excavation Safety	_____/_____/_____	Excavation Safety	_____/_____/_____
	Confirmed by Training Coordinator / Supervisor Name: _____		Confirmed by Training Coordinator / Supervisor Name: _____	

N	Elements	Requirements	Assessment		Re-Assessment	
			Date	Signature	Date	Signature
2	Hazard Identification Confined Space Entry	Demonstrate a good knowledge in confined space entry hazards & controls identification / the Ground Disturbance in Group Defined Practice for Control of Work; Excavations and Trenches deeper than 1.2m **Assessed by HSEA Name: _____**	____/___/__		__/___/___	
3	Site Safety	The individual must have a valid understanding of: - Access and Security / Barriers - Vehicle Traffic; Access Routes identification and preparation - Toolbox Talk - Risk Assessment, Permit to Work and Supplementary Certificates; - Excavation Inspections / Excv. Insp. Checklist - Portable Gas Detectors **Assessed by HSEA Name: _____**	____/___/__		__/___/___	
4	Energy Isolations	The individual must have a valid understanding of the relevant Energy Isolation process (P) (E) **Assessed by AA Name: _____**	____/___/__		__/___/___	
5	Roles & Responsibilities	Clear understanding of the Excavation Supervisor, Banksmen, Machinery Operator `s Roles & Responsibilities as per AzRPU Excavation Procedure. Confined Space Entrants and Stand by Man R&Rs as per AzRPU CSE procedure **Assessed by AA Name:_____**	____/___/__		__/___/___	
6	Excavation procedure	The ES must have practical experience and valid understanding of: - Method of excavation; Non-Mechanical & Mechanical Excavation - Excavated Materials - Underground communications diagrams **Assessed by AA Name:_____**	____/___/__		__/___/___	
7	Pre-excavation requirements and procedure	The individual must have a valid understanding of: - Excavation Boundaries - Excavation design requirements **Assessed by CE Name:_____**	____/___/___		___/___/____	

8	Backfilling / Site Reinstatement	Individual must have sufficient knowledge of: - Preparation for backfilling - Backfill Materials - Backfilling Guidelines - Drainage & Topography **Assessed by CE Name:_____**	____/___/__		___/___/__	
9	Slope Requirements and Ground Type	Individual to have required knowledge in slope requirements for excavations and categories of soil **Assessed by CE Name:_____**	____/___/__		__/___/___	
10	Site Controller Interviewed and Authorised	The above named is authorised as competent to carry out their duties within the Safe System of Work at < *S I T E* >. This authorisation is valid for a period of 3 years **Approved by SC Name _____**	____/___/___		___/___/____	

ES – Excavation Supervisor CE – Civil Engineer HSEA – Safety Advisor	SC – Site Controller AA – Area Authority

APPENDIX B: EXCAVATION ENTRY INSPECTION CHECKLIST

The Excavation Entry Inspection Checklist has to be filled in prior to entry NEW Excavation.

All of the Excavations deeper than 1.2 m have to be Inspected and **Excavation Entry Inspection Checklist** has to be filled in (prior to entry to Excavated Area), **before commencing work for the first time** to assure excavation is safe for Entry by the crew and: Excavation has been shored, sloped or benched; Machinery has been inspected; There is no evidence of diesel or oil spills; Spoil heaps are kept back from the sides of the excavation by at least 1m; PTW is in place; etc...

The Excavation has to be inspected by site Responsible Person and site Area Authority (or delegate) before the WCC is issued (for the first time).
If the answer to any of the questions on the Inspection Checklist is 'NO' then permission must be granted by the Site Controller.
The Excavation Entry Inspection Checklist has to be attached to the Work Confirmation Certificate after inspection is complete.

The Excavation ENTRY Inspection checklist has to be filled in when the Excavation work is completed and the crew is going in to conduct their work. Excavation Entry Inspection Checklist is not needed if the activity itself is Excavation.

EXCAVATION ENTRY INSPECTION CHECKLIST

THIS MUST BE COMPLETED PRIOR TO ENTRY NEW EXCAVATION deeper than 1.2 meter BEFORE COMMENCING WORK FOR THE FIRST TIME

If the answer to any of the questions below is 'NO' then permission must be granted by the Site Controller

Area/Location :

Checklist	YES	NO	N/A
Supervisor is aware of the CoW GDP - Ground Disturbance and definition of Confined Space			
Risk Assessment conducted			
PTW (and supplementary Certificates) are in place			
Workgroup is aware of the hazards associated with the task			
Excavation has been shored, sloped or benched			
Machinery has been inspected			
Competent Banksman is on site and easily identifiable			
Correct PPE is being identified and worn by all workers			
There is no evidence of diesel or oil spills			
Underground services have been identified			
Overhead power lines have been identified			
Spoil heaps are kept back from the sides of the excavation by at least 1m			
Drip trays are in place under stationary machinery			

Comments :

Inspected by:
Site Responsible Person:
Name: -.....Signed: -..... Date:.....Time:

Site Area Authority (or delegate):
Name: -.....Signed: -..... Date:.....Time:

If the answer to any of the questions below is **'NO'**

Approved by:
Site Controller
Name: -.....Signed: -..... Date:.....Time:

Appendix C: Emergency Procedure in the Event of Pipeline Damage

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 unauthorized persons.

Revision/Review Log

Revision Date	Authority	Custodian	Revision Details
22 October 2004	CHSSE Manager	CHSSE Team Leader	Initial Issue as controlled document
07 Sept 2007	Alan McNulty (CHSSE Manager)	Esmira Akhundova (CHSSE Team Leader)	**General:** Throughout the procedure the document numbering for referred procedures has been changed from UNIF to AzSPU. **Section 1. Introduction:** 1.2 Scope; Wording changes. Following inclusion to Section 1 are; 1.3 Legislation & Standards, 1.4 Ground Disturbance Golden Rules of Safety, 1.5 Company Requirements, 1.6 Stopping Unsafe Work, 1.7 Deviations, 1.8 Document Review, 1.9 SSOW Specific Cross References (new doc control numbers). 1.10 Language Facilitation, 1.11 Procedure Summary. **Section 2. Responsibilities:** Is now "Definitions & Abbreviations". New section. **Section 3. Access Routes:** Is now "Roles and Responsibilities". Changes made to the responsibilities of SM, SC, Area Authority, Machinery Operator. **Section 4. Route Identification and Preparation:** Is now "Trenches and Excavations". New section. **Section 5. Site Safety:** Is now "Access Routes". **Section 6. Pre-excavation Requirements and Procedure:** Is now "Route Identification and Preparation". **Section 7. Excavation Procedures:** Is now "Site Safety". Under 7.3 Excavator Operators; Word 'certified' included into line. **Section 8. Backfilling Procedures:** Is now "Pre-excavation Requirements and Procedure". Under 8.4 Excavation Boundaries; Additional paragraph added. Under 8.7 Risk Assessment, PTW and Supplementary Certificates; Bullet point – Cold Work Special Task Permit changed to – Permit to Work

			Certificate. **Section 9. Site Reinstatement:** Is now "Excavation Procedures". Under 9.1 Excavation Inspections; Second bullet point changed from – 'after rainstorms' to 'After severe weather conditions or seismic activity. **Section 10. Documentation:** Is now "Backfilling Procedure". **Section 11.** Is now "Site Reinstatement". **Section 12.** Is now "Documentation". **Appendices.** Appendix: A, List of Abbreviations and Definitions moved to section 2 of the main document. Appendix A is now Emergency Procedure in the Event of Pipeline Damage. 3 new appendices included to the document as follows: **Appendix B:** Excavation Inspection Checklist **Appendix C:** Procedure Summary **Appendix D:** Feedback & Improvement suggestions
07 November 2008	Alan McNulty CHSSE Manager	Adalat Mamedov Central Team Lead	The next review/revision date is extended to 15.04 2009 due to rescheduling
05 December 2008	Yuliy Zaytsev Safety & Compliance Systems Manager	Adalat Mamedov Central Team Lead	Authority position/name has changed to reflect org changes in HSE&TD as of December 1st 2008
23 April 2009	Yuliy Zaytsev Safety & Compliance Systems Manager	Niyaz Mamedov HSE Systems – Cotrol of Work Advisor	Paragraph 3.2 – two new bullets are added Paragraph 7.1 – wording changes in regard to hard barriers using Paragraph 8.1 – additional wording is given regarding Excavation Certificate requirements Paragraph 9.4 – new bullet is added
22 January 2011	Yuliy Zaytsev Offshore Health & Safety Manager	Elman Shikhkerimov Safety Systems/CoW Lead	The numbering of the Procedure is entirely changed inline with AzSPU HSE Standardized Document Management Procedure Template(ASPU-HSSE-DOC-00025-A1) Previous Lessons Learned: HiPOs database, Traction Incident reports, Legal Environment, Group requirements have been tackled to see if any changes required **Section 2 Definitions and Abbreviations** Removed irrelevant abbreviations Added new "Hazardous area" definition **Section 3 General Requirements** has been amended with "shall" statements in order to meet relevant group requirements

			Reference to Golden rules, GHSER elements and to Deviations procedure have been taken out from use **Sub-Section 5.2 Route Identification & Preparation(Construction)** insert “made” wording to sentence to make a sense **Sub-Section 5.3 Site Safety - Lighting** updated with additional pointing details 5.4 **Pre-excavation requirements and procedure - Permit Requirements** second bullet point added with additional permit controls requirement **Sub- Section 5.5 Excavation Procedures** Removed duplication notes on excavator’s bucket requirements Removed confusing note “Seat belts should not be worn if the equipment is not fitted with a ROPS.” **Appendix A:** New Excavation Supervisor Competency Checklist has been developed in order to bring consistent approach in assessment process across organization. **Appendix B:** New Entry Inspection Checklist has been developed in order to bring consistent approach in assessment process across organization. This review has also resulted in AzRPU Control of Work Training Policy (AZSPU-HSSE-DOC-00088-2) being revised, where clarification given on Excavation safety training.