AzSPU Procedure for Management of Radioactive Materials and Radiation Generators

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1 Purpose/Scope

Azerbaijan Strategic Performance Unit (AzSPU) has a responsibility to ensure that all work with ionising radiation, including the use of radioactive materials and radiation generators, is carried out in accordance with applicable national and international legislation and standards.

The purpose of this document is therefore:

- to define the AzSPU's Ionising Radiation Policy, the aims and objectives of which are to ensure that all work with ionising radiation is carried out in accordance with applicable national and international legislation and standards.
- to describe how the Policy objectives will be achieved through a Radiation Protection Programme; and
- to provide detailed information and procedures relating to radiation safety.

This controlled procedure applies to AzSPU Operations PUs and Projects engaged in the drilling, production, and/or transportation of oil and gas (including support activities), and construction activities when working with ionising radiation in Azerbaijan. Contractors working on AzSPU owned or operated sites/installations are also required to align with this procedure.

This procedure is written in sufficient detail to enable it to be applied consistently at all sites or installations. There may still be the requirement for some site-specific instructions covering logistical & administrative arrangements, and site-specific variations in responsibilities to reflect differences in organisational arrangements. These site-specific instructions should not deviate from the core processes within this document. Any form of deviation from this procedure, including but not limited to site-specific instructions, shall be requested and authorised in accordance with the AzSPU Deviations Procedure (AzSPU-HSSE-DOC-00011-2).

Revision of this procedure and the operational controls detailed therein will be in accordance with the AzSPU HSSE Document Management Procedure (AzSPU-HSSE-DOC-00025-2).

2 Definitions

Refer to document AzSPU HSSE Definitions AzSPU-HSSE-DOC-00021-2 for definitions common to this HSSE&S MS. Definitions specific to this procedure are included in Appendix A.

3 General Requirements

3.1 Legislative Requirements

The principle piece of legislation in Azerbaijan is the Law of the Azerbaijan Republic on Radiation Safety of the Population, No. 423IQ, 30th December, 1997. Article 3 of the Law lists the Basic Principles for Ensuring Radiation Safety. These principles are based on, or have parallels with, the basic principles of Justification, Optimisation and Dose Limitation, as recommended by the International Atomic Energy Agency in Safety Series 115 'International

Basic Safety Standards for Protection Against Ionising Radiation and for the Safety of Radiation Sources' (IAEA, 1996).

The IAEA principles in Safety Series 115 (SS115) are summarised here:

Justification (Substantiation)

No practice involving exposure to radiation should be adopted unless it produces at least sufficient benefit to the exposed individuals or to society to offset the radiation detriment caused.

Optimisation (Intimation)

All exposures shall be kept As Low As Reasonably Practicable (ALARP), economic and social factors being taken into consideration.

Dose Limitation (Standardisation)

The doses received by individuals from practices involving radiation, should not exceed the relevant limits specified by the Regulatory Authority.

The dose limits specified in SS115 dose limits, Schedules II-5, II-6 and II-8 are:

	Annual Dose Limits		
	Workers	**Public**	**Trainees**
Whole Body Effective Dose	20 mSv	1 mSv	6 mSv
Lens of the eye (Equivalent dose)	150 mSv	15 mSv	50 mSv
Extremities (hands and feet) or skin	500 mSv	50 mSv	150 mSv

In the special case of female workers, the worker must notify management on becoming aware that she is pregnant so that the worker's working conditions can be reviewed. A dose limit of 1 mSv to the embryo or foetus will be applicable in this situation.

3.2 AzSPU Ionising Radiation Policy

AzSPU is committed to a policy of restricting exposure to ionising radiation in accordance with the ALARP principle and ensuring that dose limits are not exceeded. This principle will be applied in all situations involving work with ionising radiation, whether the work is carried out by AzSPU, or by contractors operating on AzSPU sites. AzSPU will affect this through the implementation of the organisational arrangements and responsibilities detailed in the Radiation Protection Programme (see Section 5.1). AzSPU will also take all reasonably practicable steps to protect the environment from discharges and disposal of radioactive waste.

AzSPU will comply with all applicable national and international legislation. Account will also be taken of international standards in radiation protection, such as may be issued periodically by the International Atomic Energy Agency. In all situations the objective will be to provide the highest standard of radiation protection.

AzSPU shall ensure that workers exposed to radiation from sources, other than natural sources, that are not directly related to their work or not required by their work, receive the

same level of protection as if they were members of the public. This in effect applies a dose limit of **1 mSv** to individual **members of the general workforce** who are **not involved in work with ionising radiations**, but who may be exposed as a result of ongoing work with ionising radiation.

Furthermore, AzSPU will ensure that the use of radioactive materials and radiation generators in equipment or processes, or by third party contractors is subject to a justification process.

This will be a relatively simple and straightforward process for common practices such as the use of nucleonic instrumentation, well logging and radiography (both X and gamma), where the justification for the use of radiation sources over other methods is well established. For most other industrial uses of radioactive materials or radiation generators, the justification process should again be relatively straightforward, providing consideration has been given to alternative methods or technologies and that the radiation doses that are likely to be received by affected personnel will not be significant and that there are clear advantages in terms of cost and resources. However, cost alone should not be the only reason for ruling out alternatives that do not involve radioactive materials or radiation generators.

In the event that the use of radioactive materials or radiation generators cannot be easily justified, then the Radiation Protection Adviser (RPA) should be contacted for advice.

It will not normally be necessary to restrict exposure from routine operations (unless otherwise identified by a risk assessment), however, pregnant workers will not be allowed to work with unsealed radioactive materials, including NORM.

These policy goals will be achieved by implementing a **Radiation Protection Programme** (Section 5.1), the main elements of which are as follows:

- Assigning responsibilities for occupational radiation protection and safety;
- Designating controlled or supervised areas;
- Providing procedures, local rules, work instructions, etc for workers to follow and appointing individuals to supervise work with ionising radiation;
- Monitoring workers and the workplace as appropriate, including the acquisition and maintenance of radiation monitoring instruments;
- Recording and reporting all the relevant information related to the control of exposures, the decisions regarding measures for occupational radiation protection and safety, and the monitoring of individuals;
- Providing suitable and sufficient training to all persons involved in work with ionising radiation;
- Carrying out periodic reviews / audits of performance and compliance;
- Providing contingency plans to address accident situations;
- Providing a health surveillance programme for certain individuals as appropriate.

4 Key Responsibilities

AzSPU Azerbaijan Leadership Team (ALT)

The ALT is ultimately accountable for ensuring that all radiation exposures are as low as reasonably practicable (ALARP) and for ensuring that dose limits are not exceeded. They are also accountable for ensuring that the requirements of applicable national and international legislation are met.

Although these responsibilities cannot be delegated, AzSPU ALT will aim to fulfil their responsibilities by implementing the following organisational arrangements and appointments.

AzSPU HSE & Technical Vice-President / AzSPU Safety & Compliance Manager

AzSPU HSE & Technical Vice-President / AzSPU Safety & Compliance Manager are accountable and responsible (respectively) for ensuring that suitable organisational and procedural arrangements are in place in order that the AzSPU Radiation Protection Programme can be implemented.

In addition they are accountable / responsible for:

- Appointing an AzSPU Radiation Protection Single Point Accountability (RP SPA).
- Appointing a suitable Qualified Expert / Radiation Protection Adviser (RPA) to provide advice to AzSPU SPA on radiation safety matters and legal compliance issues and to ensure that all work with ionising radiation at AzSPU sites is audited on a regular basis.

AzSPU Radiation Protection Single Point Accountability (RP SPA)

The RP SPA occupies a central HSE role and resides in the AzSPU Safety & Compliance Team covering Onshore and Offshore Operations, Drilling, Completion & Intervention (DC&I), as well as major projects. The duties of the RP SPA are summarised as follows:

- Ensuring that the AzSPU Procedure for Management of Radioactive Materials and Radiation Generators is reviewed on a regular basis.
- Providing internal coordination between PUs and departments to ensure alignment of processes and practice.
- Ensuring that internal monitoring is in place and carried out on regular basis.
- Providing contractor management.
- Maintaining proper communication flow between the RPA (UK based) and the AzSPU Radiation Protection Supervisors (RPSs).
- Coordination of radiation protection audits.
- Liaising with government bodies regarding radiological protection issues, if required.
- Ensuring timely development of required reports, if any.
- Supporting investigations into radiation related issues.

AzSPU Radiation Protection Adviser (RPA) / Qualified Expert

AzSPU will retain, by contract and appointment, Radiation Protection Advisers (also called Qualified Experts) to provide the AzSPU with expert advice on radiation safety and to advise on compliance matters. The RPA will report to the AzSPU Safety & Compliance Manager and work directly with the AzSPU RP SPA. Contact details for the RPA's are provided in Appendix B.

An important part of the RPA's role will be to carry out a review of all activities involving ionising radiation at AzSPU facilities to determine whether associated exposures are ALARP. Audits will be carried out to this end, the frequency of which will be determined by the AzSPU Safety & Compliance Manager, in agreement with the Offshore & Onshore PULs and DC&I & MPPU VPs. Matters on which the RPA should be consulted are:

- Radiation risk assessment;
- Radiation procedures;
- Emergency response plans;
- Methods for restricting exposure;
- Designation of areas;
- Training;
- Radiation monitoring and selection and calibration of radiation monitoring equipment;
- Maintenance of engineering controls;
- Dose assessment and recording;
- Investigations into doses in excess of the investigation level;
- Investigation of accidents.

AzSPU Safety & Compliance Team

AzSPU Safety & Compliance Team is responsible for identifying and communicating current applicable legislation for work involving ionising radiation, and for maintaining the Compliance Task Management (CTM) database.

Site Manager / Offshore Installation Manager (OIM)

The Site Manager / OIM is accountable for all aspects of radiation safety on any site under his control or authority. He will ensure that the radiation procedures are implemented and that suitable local arrangements are made to achieve the AzSPU's Ionising Radiation Policy goals. In particular he is accountable for ensuring that:

- Suitable persons have been appointed to supervise work with ionising radiation i.e. Radiation Protection Supervisors (RPSs) and that a Site Register of RPSs is kept.
- All persons involved in work with ionising radiation have received adequate training and details of their training are recorded.
- The radiation procedures and site-specific instructions are made available to those persons who are affected by them.
- Suitable and sufficient radiation monitoring instruments are provided.
- Prior to any work with ionising radiation, a risk assessment is carried out.
- Suitable and sufficient personal protective equipment is provided, as and when necessary, for the prevention of contamination of personnel.
- Suitable and sufficient work equipment and facilities are provided for all work with ionising radiation.
- Suitable records are kept with details of the radioactive substances that are used or stored on site, or that are disposed of from site i.e. the Site Radiation Records.

Radiation Protection Supervisors (RPSs)

The Site Manager / OIM will appoint RPSs to ensure that, on a day to day basis, all work is carried out and supervised in accordance with AzSPU procedures, site-specific instructions, etc. Specific duties of the RPS are:

- To ensure that all work with ionising radiation is subject to a radiation risk assessment.
- To implement Contingency Plans for incidents or accidents involving work with ionising radiation.
- To be a first point of contact for all persons with concerns regarding radiation protection on site.

- To liaise with the Site Manager / OIM regarding radiation protection issues and the implementation of the radiation procedures.
- To maintain the Site Radiation Records.
- To assist and participate in radiation safety audits organised by AzSPU RP SPA and conducted by the RPA.
- To ensure that any work with radioactive substances, carried out by contractors, is in full compliance with the requirements of their radiation procedures or site-specific instructions.

AzSPU Permitting and Regulatory Affairs / AzSPU Central Environmental Team

AzSPU Permitting and Regulatory Affairs are responsible for liaising with regulatory bodies, e.g. Azerbaijan Ministry of Emergency Situations (MES), regarding permitting and licensing issues. AzSPU Central Environmental Team is responsible for liaising with Azerbaijan Ministry of Ecology and Natural Resources (MENR).

Authorised Persons

Personnel may be appointed to carry out specific tasks included in this procedure. These individuals will be authorised by the Site Manager / OIM to carry out those tasks provided they have attended a suitable radiation awareness course, appropriate to the task involved. Training records and a Register of Authorised Persons will be maintained in the Site Radiation Records. Examples of tasks for which Authorised Persons may be appointed are routine radiation monitoring and safety checks around fixed nucleonic sources and contamination (NORM) checks.

Workers

All workers are responsible for the safety of themselves and others who may be affected by their actions or inactions. In particular, all workers are required to:

- Follow any applicable procedures or local rules relating to radiation protection or safety.
- Use monitoring devices and personal protective equipment and clothing provided.
- Comply with any dose assessment or health surveillance programmes.
- Provide AzSPU with information about previous occupational exposure to ionising radiation.
- Refrain from any actions that will cause unnecessary exposure of themselves or others.
- Take appropriate actions to ensure their personal exposure to radiation is ALARP, through using safe working practices on which they are trained.
- Accept information, instruction and training on radiation protection and safety that will enable them to carry out their work in accordance with the radiation procedures or local rules.

In addition, female workers will have the responsibility of informing management when they know, or suspect, that they are pregnant.

Contractors

All third party contractors working with radioactive sources or radiation generators on AzSPU sites will be required to work according to this procedure and in compliance with applicable national and international legislation. In all cases third parties will have appointed a Radiation Protection Officer (RPO) to supervise their work. The Contractor RPO will be

responsible for ensuring that all work is carried out in accordance with this radiation procedure, or site-specific instructions, and meets the requirements of applicable national and international legislation.

5 Procedure

5.1 Radiation Protection Programme (RPP)

5.1.1 Designation of Controlled & Supervised Areas

As a means of restricting radiation exposure, work areas will be designated as either 'Controlled' or 'Supervised'.

In determining whether an area should be categorised as Controlled or Supervised, the following criteria will be used:

5.1.1.1 Controlled Areas

A controlled area is a workplace in which an individual could be exposed to an annual radiation dose greater than 6mSv. This annual dose is translated into the following criteria, which are designed to ensure that the annual dose is not exceeded:

- The whole body dose rate exceeds 7.5 μSv/h averaged over 8 hours, or the dose rate to the hands, forearms or feet exceeds 75 μSv/h. (Note. Where the dose rate is less than 7.5 μSv/h, it will still be necessary to demonstrate by risk assessment that 6 mSv a year will not be exceeded, otherwise a controlled area will be designated).

Controlled areas will also be designated in the following situations:

- For work involving mobile radioactive sources e.g. well logging, radiography and radiotracer studies (Note. Work with mobile radioactive sources may give rise to dose rates exceeding 7.5 μSv/h outside of the controlled area, provided that the exposure is of short duration i.e. a few tens of seconds).
- Where a source of radiation has the potential to give rise to significant exposures over a short period of time (e.g. X-ray equipment).
- Where work involving unsealed radioactive substances is carried out and there is a risk of contamination being spread (including by airborne means) outside of the work area and if there is potential for elevated exposures.
- Where a person is required to bodily enter an area in which contamination is, or may be, present.

Requirements for Controlled Areas:

- The extent of any Controlled Area will be delineated by physical means;
- Where practicable, barriers will be erected to restrict access;
- Access shall be further restricted using the Safe Systems of Work;
- Radiation warning signs will be posted at all entrance points.
- Work in Controlled Areas shall only be carried out in accordance with applicable national and international legislation.

- A Radiation Protection Supervisor shall be present at the commencement of all work carried out in a Controlled Area. Once work has commenced, the RPS will carry out periodic checks based on risk assessment of the task in hand.

NB: It should be remembered that decks above and below the source may require barriers dependent on the dose rate.

An RPS may designate a temporary controlled area, without the need for barriers or warning signs, on the basis that the duration of any work will be short (subject to risk assessment) and access to the area can be adequately restricted.

Contractors who designate their own Controlled Areas shall do so using the criteria above. Alternative arrangements that provide at least the same level of protection may be used.

In the event that a Contractor takes control of a Controlled Area established by the AzSPU RPS, then the Controlled Area Handover Certificate (Appendix C) must be completed and copies filed in the Site Radiation Records.

5.1.1.2 Supervised Areas

A supervised area will be designated in any area not already designated as a controlled area but where occupational exposure conditions need to be kept under review, even though specific protection measures and safety provisions are not normally needed.

A supervised area will be designated in any area where it is likely that someone could exceed an effective dose of more than 1 mSv per year. This annual dose is translated into the following criteria, which are designed to ensure that the annual dose is not exceeded:

- The whole body dose rate exceeds 1 μSv/h but is less than 7.5 μSv/h.

Based on the above, a supervised area will be designated as follows:

- Where routine radiation monitoring (including contamination monitoring) is carried out for the purposes of keeping the conditions in that area under review.
- Where work with unsealed radioactive material is carried out for which a Controlled Area has not already been designated and where there is little or no risk of a spread of contamination i.e. the material can be easily contained.

Note. It will not automatically be necessary to set up a supervised area around every controlled area, as the requirements for the controlled area are likely to be sufficient.

Requirements for Supervised Areas:

- Access to supervised areas designated on the basis of external dose rate will not normally be restricted.
- Warning signs do not need to be displayed at all supervised areas, but they will be displayed in the case of work with unsealed materials.

5.1.2 Radiation Procedures and Radiation Protection Supervisors

5.1.2.1 Radiation Procedures and Site-Specific Instructions

Radiation procedures are provided for all aspects of work with ionising radiation carried out by AzSPU, including the management of contractors working with sources of ionising radiation (see Section 6). The procedures contain, where appropriate, the following:

- Key working instructions for ensuring that radiation exposures are kept ALARP.
- Arrangements for monitoring exposures (area monitoring, personal monitoring, or a combination of both).
- Dose investigation or trigger levels.
- Contingency plans for reasonably foreseeable incidents and accidents.

Additionally, site-specific instructions will be drawn up for any site that designates controlled areas or Radioactive Substances Storage Areas, including those used for Contractor's sources. The site-specific instructions will detail the local arrangements for radiation protection and they must reflect the AzSPU Ionising Radiation Policy, the Radiation Protection Programme and this procedure.

Contractors who designate their own controlled areas will be required to provide their own procedures or site-specific instructions and Radiation Protection Officers.

5.1.2.2 Radiation Protection Supervisors (RPSs)

RPSs will be formally appointed by the Site Manager / OIM for the purpose of ensuring compliance with the radiation procedures or site-specific instructions. Prior to appointment, RPSs will attend a suitable training course, appropriate to the nature of the work and attain a pass mark of at least 70%. A copy of the letter of appointment and the RPS's training certificate will be maintained on site in the Site Radiation Record along with a Register of Appointed RPSs.

Also, only those individuals who have the authority to exercise supervision over work with ionising radiation will be appointed.

A copy of the Register of RPSs will be made available to the Control Room and Emergency Response Team (ERT). The AzSPU Radiation Protection SPA should be notified in the event that the Register of RPSs is amended.

As part of the annual audit, the RPA will review the competence of the RPSs and report his findings to the Site Manger / OIM and the AzSPU Safety & Compliance Manager.

5.1.3 Monitoring of Workers, the Workplace, and Radiation Monitoring Equipment

5.1.3.1 Monitoring of Workers

In general, for any worker who is normally employed in a controlled area, or who occasionally works in a controlled area and is likely to receive an annual exposure exceeding 6 mSv, individual dose assessment will be undertaken. Individual dose meters will be provided in this instance. In consultation with the RPA, it may be possible in some circumstances to assess occupational exposure on the basis of the results of monitoring of the workplace and on information on the locations and durations of exposure of the worker. In any case the RPA must be consulted if a risk assessment shows that individual dose assessment may be necessary.

For any worker who is regularly employed in a supervised area or who enters a controlled area only occasionally, individual monitoring will generally not be required, but the

occupational exposure of the worker shall be assessed on the basis of the results of monitoring of the workplace.

In both of the above cases, the exposure will be recorded on the Record of Entry Into Controlled Areas (Appendix D) and the Radiation Exposure Log (Appendix E).

Dose assessment will not be required for workers who only enter supervised areas occasionally, on the basis that occupancy rates will be low and the radiation levels are routinely monitored.

In the unlikely event that work carried out by AzSPU will cause individual dose assessment to be necessary (based on the outcome of a risk assessment), the RPS will be responsible for issuing and collecting dose meters from the appropriate personnel. The RPS will be responsible for examining the dose records to ensure that dose investigation levels are not being exceeded.

It will be the responsibility of each worker issued with a dose meter to look after it and to wear it when there is a potential for exposure. The dose meters will only be worn at work.

The wear period for dose meters will be determined by a risk assessment and with reference to Decree No. 134 of the Cabinet of Ministers of AR "On Approval of the Rules on Form and Completion of Radiological-Hygienic Passports of Territories, Enterprises and Organizations and the Rules of Recordation and Control Over Individual Ray Doses", 25.08.1999.

5.1.3.2 Monitoring of the Workplace

Where monitoring of the workplace is required on-site documents will specify:

- The quantities to be measured;
- Where and when the measurements are to be made and at what frequency;
- The most appropriate measurement methods and procedures;
- Reference levels and actions to be taken if they are exceeded;
- Who will perform the monitoring.

All monitoring will be carried out in accordance with the principles stated in Appendix F (Radiation Monitoring).

5.1.3.3 Radiation Monitoring Equipment

AzSPU Operational Assets or Projects will provide suitable and sufficient monitoring equipment, according to the nature of the work, where a requirement to carry out monitoring has been identified in either procedures or risk assessments. This will include dose rate meters, contamination monitors and where appropriate, personal air samplers. The RPA will be consulted with regards to the suitability of any new radiation monitoring equipment being used or purchased.

Radiation monitoring equipment will be calibrated at least once every twelve months by an approved testing service; advice will be obtained by from the RPA if necessary. Additional function tests shall be specified in the radiation procedures or local rules as appropriate.

The Site RPSs will maintain a Site Register of Radiation Monitoring Equipment (Appendix G) that will include details of all dose rate and contamination monitors. The following information will be recorded:

- Manufacturer
- Model
- Serial No.
- Date last tested
- Reason for test (i.e. “Routine” or “Damaged”)
- Next test due

All radiation monitoring instruments must be kept in a good state of repair and be inspected for damage prior to use. Damaged instruments must not be used and will be sent for repair as soon as is practicable.

Each site that uses contamination monitors will keep a test source so that the function of the instrument can be checked prior to use. Details of the test source will be recorded in the Site Register of Radiation Monitoring Equipment (Appendix G).

5.1.4 Recording and Reporting Monitoring Information

5.1.4.1 Occupational Radiation Protection and Safety (Risk Assessment)

The decisions regarding measures for occupational radiation protection and safety will be determined by radiation risk assessments. The scope and content of the risk assessments will be defined by the RPA. All radiation risk assessments will be site specific and records of risk assessments will be maintained in the Site Radiation Records. The Radiation Risk Assessments will be copied to the AzSPU RP SPA and Permitting and Regulatory Affairs.

Task Risk Assessments will be carried out for specific tasks with ionising radiation not already covered by a general risk assessment.

Work with ionising radiation will be subject to the Permit to Work System.

5.1.4.2 Workplace Monitoring Records

The results of workplace monitoring will be recorded in the appropriate form in the radiation procedures or local rules. Copies of the records will be kept in the Site Radiation Records for review, auditing and compliance purposes.

5.1.4.3 Individual Monitoring Records

Where an individual is subject to personal dosimetry, a ‘personal record card’ will be created and a record of the individual’s dose will be kept in accordance with the requirements of Resolution 134 of the Cabinet of Ministers of the Azerbaijan Republic. Records will be maintained while that individual is employed by BP and for 50 years following termination of employment. If the individual leaves employment with BP to work for another employer, then a copy of the individual’s summary dose record will be made available to the new employer.

5.1.4.4 Dose Investigation and Trigger Levels

In order to manage exposures, a Trigger Level and a Dose Investigation Level are used.

Since personnel are not routinely exposed to radiation and are not required to wear personal dose meters, the assessment and management of personal exposures will be based on the results of workplace monitoring.

The trigger level is the dose rate at or above which an informal investigation should be carried out by the RPS to determine the cause of the elevated dose rate and what actions are necessary to re-establish normal conditions.

A trigger level is set at 7.5μSv/h. If a dose rate of 7.5μSv/h or above is measured during routine monitoring, or vessel entry, then the RPS should immediately investigate to determine the cause and take action as necessary to restrict exposure.

The dose investigation level is the dose at which exposures are deemed no longer ALARP and a formal investigation is initiated to determine the cause of the exposure and the actions needed to ensure that continued exposure is ALARP.

If any individual receives a dose in excess of 60 μSv in 8 hours, this will be investigated and the AzSPU RP SPA and the RPA will be informed.

5.1.5 Provision of Training to Persons Involved in Work with Ionising Radiation

Everyone involved in work with ionising radiation will receive radiation protection information, instruction and training as appropriate. The level of training required will be agreed by the AzSPU Safety & Compliance Manager and the AzSPU Radiation Protection SPA and reviewed periodically. The AzSPU Safety & Compliance Team will conduct audits of the training as part of the AzSPU integrated HSE internal audit programme.

Management will receive training in the basic principles of radiation protection and their main responsibilities within the Radiation Protection Programme.

It is the Site Manager / OIM's responsibility to ensure that workers who may be exposed to ionising radiation and individuals with assigned responsibilities receive the necessary training.

In particular, the Site Manager / OIM will ensure that persons required to supervise work with ionising radiation, which includes supervising contractors working with ionising radiation, attend an approved Radiation Protection Supervisors Training Course.

The Site Manager / OIM will also ensure that individuals who may be exposed to radiation as a result of work carried out in a controlled or supervised area attend a Radiation Awareness Training Course appropriate to the hazard involved e.g. Radiation Awareness for Gauge Users, or Radiation Awareness for Persons Working with Naturally Occurring Radioactive Material.

Emergency Response Teams (ERT) will receive specific training highlighting the potential hazards and the steps to be taken to minimise potential exposures to the individuals in the team and others.

Training courses and materials should be agreed with and approved by the AzSPU RP SPA and the AzSPU Safety & Compliance Manager respectively.

Potential radiation hazards will also be included in general Site HSE inductions.

5.1.6 Periodic Reviews / Audits of Performance and Compliance

The RPA will carry out radiation safety and compliance audits at all facilities and sites where there is occupational exposure to ionising radiation. The RPA will report his findings to the Site Manager / OIM, the AzSPU Safety & Compliance Manager and the AzSPU RP SPA. Any significant findings will be discussed at the Quarterly Cross-SPU HSE meeting.

5.1.7 Provision of Contingency Plans to Address Incidents / Accidents

All reasonably foreseeable incidents and accidents will be identified in a radiation risk assessment.

In case of any incident involving radioactive materials, the AzSPU Radiation Contingency Plan (AzSPU-HSSE-DOC-00086-2) shall be followed. This document also describes the process for notifying authorities in the event of an incident.

5.1.8 Provision of a Health Surveillance Programme

Specific health surveillance, over and above routine health surveillance, will not be carried out, except in the case of workers for whom a risk assessment has shown that they are likely to receive an effective dose in excess of 6 mSv in a year.

5.2 Management of Contractors Working With Ionising Radiation

The use of radioactive materials in either a sealed or unsealed form and the use of radiation generating equipment such as X-ray machines, is carried out from time to time by Contractors operating on AzSPU managed sites, both offshore and onshore.

The most common uses of ionising radiation include the following:

- Industrial radiography using sealed sources or X-ray machines.
- Well logging using gamma and neutron sealed sources (either wire-line operations or measuring while drilling techniques) and Minitron neutron generators.
- Vessel, pipe or jacket member scanning using sealed sources.
- Radiotracer work involving the injection of unsealed radioactive material into a vessel or pipeline.

In the special case of work involving Naturally Occurring Radioactive Material (NORM), AzSPU is responsible for managing the HSE aspects on the basis that the material has arisen as a direct result of AzSPU operations i.e. the extraction of oil and gas. This work is covered by the Procedure for Working with Naturally Occurring Radioactive Materials (NORM) (AzSPU-DOC-HSSE-00097-2).

Work with ionising radiation carried out by contractors has the potential to cause radiation exposure of other persons working nearby. In the case of AzSPU managed sites, this includes AzSPU personnel, other contractors, and visitors to the site.

5.2.1 Management Arrangements

Site Management have the ultimate responsibility for ensuring that work with ionising radiation is carried out in accordance with this procedure and the Radiation Protection Plan. This responsibility cannot be delegated to employees, workers, the radiation protection supervisor (RPS), the AzSPU RP SPA, the RPA or anyone else.

All persons who may be affected by the content of this procedure should be made aware of the relevant details. Site management will enable a free flow of radiation protection and safety related matters between workers and management.

5.2.2 Responsibilities

Responsibility for ensuring that work with ionising radiation is carried out safely and in accordance with the regulatory requirements generally rests with the owners and users of sources of ionising radiation, whether radioactive materials or radiation generating equipment such as X-ray machines.

Where radioactive materials need to be imported (or exported) for the intended work and where the work may involve a change of ownership of radioactive sources from a third party to AzSPU (e.g. where sources are installed in nucleonic equipment), then the Procedure for Import / Export of Radioactive Materials and Sources of Ionising Radiation (AzSPU-HSSE-DOC-00083-2) must be implemented. This is to ensure that contractors / subcontractors are aware of the statutory requirements in the Azerbaijan legislation, and that the necessary forms are completed and forwarded to the Permitting and Regulatory Affairs Team prior to a Permit being issued by the authorities. This process also allows the Permitting and Regulatory Affairs Advisor to maintain an up to date radioactive source inventory.

Contractors carrying out work with ionising radiation on AzSPU managed sites have a duty to carry out that work so that they achieve a suitable level of protection of themselves and other persons, including AzSPU personnel, other contractors, and site visitors who could be affected by their work.

AzSPU has a duty to ensure so far as is practicable that only suitably trained and qualified personnel, who have been deemed competent, undertake work with ionising radiation on any AzSPU managed site. To this end, arrangements should be made at the contractual stage to verify that the contractor meets a minimum level of competence and is aware of the AzSPU requirements specified here. AzSPU however is not responsible for the competence of the contractor and it is a legal obligation of the contractor to ensure that his staff have received suitable training and are competent to conduct work with ionising radiation.

The method of controlling this type of work is based on a two-stage process, aimed at verifying a minimum level of competence of the contractor. The first stage involves a review of the contractor's arrangements for managing the proposed scope of work safely and in accordance with the applicable legislation. Verification needs to be made at the contractual stage so that contracts are not signed unless the Contractor has demonstrated a minimum level of competence.

The second stage focuses on verifying the competence of the individual personnel who will be carrying out the work and ensuring that they have appropriate resources to allow them to carry out the work safely.

5.2.3 Contractor's Arrangements for Managing Work with Ionising Radiation

Contractors must be able to demonstrate that they have effective systems in place for managing work with ionising radiation.

PSCM will include a requirement for contractors to provide documentary evidence of their radiation management system, which must be reviewed by the relevant Technical Authority

or Subject Matter Expert (SME) in consultation with the AzSPU RP SPA and relevant RPS if necessary, before a contract is awarded. Alignment with the AzSPU radiation procedures should also be ensured. If necessary the RPA should be contacted for further assistance.

As a minimum, the contractor must have the following in place as part of their management system:

5.2.3.1 Special Permit

A copy of the Special Permit to carry out work with ionising radiation for the type of work included in the proposed scope of work. Special Permits are issued by the State Committee for the Supervision of Safe Industrial and Mining Practices (SCSSIMP) of the Ministry of Emergency Situations and are valid for three years. Details on permitting processes are provided in the Radioactive Materials Regulatory Management System, The Import / Export of Radioactive Materials and Sources of Ionising Radiation Procedure (AzSPU-HSSE-DOC-00083-2).

Work with ionising radiation must not be carried out if a contractor does not have a Special Permit. If the Special Permit is due to expire prior to the end of the proposed scope of work then the contractor must provide evidence of the arrangements that have been made to obtain a new licence at that time.

5.2.3.2 Radiological Hygiene Passport

In addition to the Special Permit, the contractor must have a current Radiological Hygiene Passport that is approved by the Centre of Hygiene and Epidemiology of the Ministry of Health and SCSSIMP of the Ministry of Emergency Situations. Radiological Hygiene Passports are valid for a period of one year.

5.2.3.3 Risk Assessment

A suitable risk assessment, which may be in the form of a generic risk assessment for the proposed scope of work, must be available. The risk assessment will identify the ordinary control measures that are required to carry out the work safely. The risk assessment will also identify all reasonably foreseeable accidents or incidents and the steps that are necessary to prevent these accidents, or to mitigate their consequences. Job specific risk assessments may be necessary prior to work commencing.

5.2.3.4 Radiation Procedures

A copy of the Contractor's 'Radiation Procedures' (or 'Site-Specific Instructions' etc), which describe the arrangements for the management of the radiation protection aspects of the intended scope of work are required. The procedures should describe any controlled or supervised areas, how access to these areas will be restricted, and how radiation exposures will be assessed. In particular, the procedures should describe how the radiation exposure of personnel who are not employed by the contractor will be both controlled and assessed e.g. a driller who is exposed in the doghouse when well logging sources are handled on the drill floor.

The equipment used to restrict radiation exposure must be described in the procedures, including any barriers, warning signs and warning devices, and PPE where appropriate.

5.2.3.5 Contractor's Personnel & Training Records

A list of all personnel who may be involved in the work must be submitted to the Technical Specialist (formerly CAM) along with evidence of relevant training and copies of training certificates, prior to arrival of the contractor at the site / facility. The Technical Specialist will forward these records on to the site RPS and Site Manager / OIM.

Training records must demonstrate that personnel who are responsible for putting the emergency response plan into effect have received appropriate training.

In the event that the contractor wishes to include additional personnel to the work team after the work has commenced, he must submit the same information to the Technical Specialist and the site RPS and Site Manager / OIM.

5.2.3.6 Radiation Monitoring Equipment

The contractor should specify what radiation monitoring equipment will be used for the work. The monitoring equipment must be suitable for the type of work and calibration / test certificates must be supplied that show that the equipment has been tested (and passed the test) within the last twelve months. It must be clearly stated in any contract that the contractor is responsible for providing such equipment.

5.2.3.7 Radioactive Materials and Radiation Generating Equipment

Details of all radioactive materials and radiation generating equipment to be used for the scope of work must be supplied. For radioactive materials this will include the following:

- Radionuclide e.g. caesium-137, krypton-85.
- Form of the material e.g. gas, liquid, sealed source or Special Form source (note, in the case of a Special Form source a copy of the Special Form Certificate for the source must be supplied).
- Activity of the radioactive material with a reference date.
- Details of the equipment that the radioactive materials will be used in and evidence that this meets applicable international standards.
- Evidence that the equipment is subject to a routine maintenance and inspection programme.

For radiation generators, the following details must be supplied:

- Type of equipment e.g. X-ray equipment or neutron generator.
- Nature of radiation produced i.e. energy of the radiation.
- Evidence that the equipment meets applicable international standards.
- Evidence that the equipment is subject to a routine maintenance and inspection programme.

5.2.3.8 Emergency Preparedness

The contractor must have a documented emergency response plan (also known as a radiation contingency plan). The emergency response plan must include:

- A list of potential incidents and accidents.
- Procedures to be followed in the event of an incident or accident.

- Roles and responsibilities of emergency response personnel (i.e. who will put the plan into effect).
- Details of the equipment to be used (i.e. the 'emergency kit').

The ERP may be a stand-alone document, or it may be part of the radiation procedures.

5.2.3.9 Classified / Category A Personnel

Where work requires Classified / Category A Personnel (persons likely to receive an effective dose in excess of 6 mSv per year, or an equivalent dose that exceeds three-tenths of any relevant dose limit – see definitions Appendix A), the contractor must provide suitable people. The contractor will provide a suitable radiation dose monitoring system for such people and ensure adequate medical surveillance.

The above will be applied retrospectively in the case of contractors already carrying out work with ionising radiation on AzSPU managed sites.

5.2.4 Completion of Contractor's Checklist by AzSPU Site RPS

Prior to any work with ionising radiation being carried out for the fist time on an AzSPU managed site, the Site RPS will carry out an audit of the contractor, using the Contractors Checklist (Appendix M).

The aims of the Checklist are to enable the Site RPS to verify that the Contractor's personnel:

- have the necessary Special Permit for the work;
- have the necessary details regarding radioactive materials;
- have the necessary equipment for restricting exposures;
- have suitable and sufficient radiation monitoring instruments for monitoring radiation levels in the workplace and in the event of an accident, and that the instruments have been tested;
- have copies of the radiation procedures/local rules;
- have sufficient RPOs to cover the scope of work;
- have suitable personal dose meters;
- have copies of their Emergency Response Plan and that any kit identified in the ERP is available and in good order;
- have suitable arrangements for accounting for any radioactive materials.

The information that the contractor is required to have could include decay charts, wipe-test certificates, authorisations, registrations and calibration certificates.

In the event that a Contractor does not meet the criteria set down in the Contractors Checklist then the Site RPS will notify the Site Manager / OIM. The OIM will decide whether or not to allow the work to go ahead and record his decision on the Contractor's Checklist.

A permit will not be issued for work with ionising radiation unless the Contractor's Checklist has been completed and been signed by the Site RPS and the Contractor' representative and if necessary the Site Manager / OIM.

5.2.5 General Arrangements for Managing Contractor Sources on Site

5.2.5.1 Storage of Radioactive Substances

The basic principles to be applied in the case of storing radioactive substances are to ensure that there is adequate security and that the materials are stored such that persons in the vicinity are not exposed to significant levels of radiation. The materials should also be stored such that there is unlikely to be any damage to the containment system that could lead to a release of radioactive substances into the work area.

All contractor radioactive substances must therefore be stored to prevent unauthorised access to those substances. Any small easily transportable container or package that contains radioactive substances must be kept locked and in a dedicated storage area that is accessible only to the contractor, the AzSPU Site RPS and the Site Manager / OIM.

The storage area must provide protection from the effects of the weather. In the case of radioactive substances that are transported to site in secure overpacks, that can not be easily transported by an individual or individuals, then it is acceptable to store the substances in these overpacks provided rainwater could not accumulate in or on the container.

Source containers must be stored so that the dose rate at the boundary of the storage area does not exceed 7.5μSv/h. Any area in which the whole body dose rate does exceed 7.5 μSv/h must be designated as a Controlled Area and barriered.

Sources must not be stored with explosives or pyrophoric material. The Site RPS should use his judgement as to the extent that each should be separated, taking into account the protection afforded by the transport containers and the quantity of explosives present.

5.2.5.2 Source Records

Each time radioactive substances are brought onto an AzSPU managed site, the Site RPS must record the details of the radioactive substances in the Site Mobile Source Movement Register (Appendix N). The Source Movement Register must subsequently be updated when a radioactive substance is either transported off the site or installed in plant equipment e.g. nucleonic gauges.

Occasionally there is a requirement for small radioactive marker sources to be fixed down hole (e.g. Cobalt-60 sources). Once these sources have been fixed down hole the Source Movement Register should be updated with details of the particular well and the depth at which the source was installed. Details of the source and its location should then be added to the Site Inaccessible Source Register (Appendix O).

The same arrangements should be made for well logging sources that are stuck down hole and are deemed irretrievable.

5.3 General Work Instructions for Working with Ionising Radiation

The following general instructions should be followed for all work with ionising radiation carried out by Contractors. Instructions specific to the nature of the work are also given in Section 5.4 Work Instructions for Site Radiography, Section 5.5 Work Instructions for Well Logging, and Section 5.6 Work Instructions for Storage and Use of Pip Tags, and Section 5.7 Work Instructions for Nucleonic Devices.

- The contractor will have procedures for the safe use of the sources available on Site. A risk assessment must be available for the operation.

- The contractor will appoint one or more of his employees on the Site as the RPO. The contractor's RPO will co-ordinate with the AzSPU RPS in all aspects of the work involving ionising radiation. He will provide his procedures and registrations to the AzSPU RPS.
- Work with ionising radiation comes within the Permit to Work System (ISSOW). An appropriate permit must be raised prior to work starting.
- The AzSPU Site RPS must complete the Contractors Checklist (Appendix M) to confirm that all of the contractor arrangements are satisfactory before work commences.
- Contractor sources must be recorded as mobile sources in the Mobile Source Register (Appendix N).
- Announcements of impending radiation work will be given over the Site public address system as part of the PTW requirements, at 30 and 15 minutes before the work commences. The announcement will give the location and duration of the work.
- A Controlled Area will be designated for the duration of the work and will include areas above and below the work site if necessary.
- In general only the contractor's personnel will work within the Controlled Area.
- There must be at least two individuals in the contractor's team and at least one of them must be an RPO.
- The dose rate at the boundary of the Controlled Area must not exceed 7.5 µSv/h.
- Mobile barriers or bunting tape will be erected around the Controlled Area.
- Warning signs will be erected around the Controlled Area indicating the radiation hazard e.g. "Controlled Area. External Radiation Risk. No Entry".
- The Contractor must provide calibrated monitors appropriate to each type of radiation used e.g. gamma and neutron.
- An announcement will also be made when the work is completed.
- All sources must be returned to the radioactive substance store when not in use.

NB: Instructions for contractors involving incidents with ionizing radiation are included within the AzSPU Radiation Contingency Plan (AzSPU-HSSE-DOC-00086-2).

5.4 Work Instructions for Site Radiography

Radiography is used on AzSPU Sites to verify the integrity of welds, corrosion studies and other NDT investigations.

The radioactive sources that are most commonly used in industrial radiography are listed below with corresponding details of the maximum activity of source that should be used on any AzSPU Managed Site.

Maximum source activities for general radiography use are:

Source	Maximum Activity
Iridium - 192	1000 GBq
Ytterbium – 169	5000 GBq
Selenium - 75	2000 GBq
Cobalt - 60	Each job must be discussed with the RPA

In addition to the General Work Instructions for Working with Ionising Radiation (Section 5.3), the following specific instructions are applicable:

- In the case of industrial radiography carried out onshore, all work with transportable items will be carried out in a dedicated radiography enclosure, unless the risks associated with the transport of the item to be inspected or resulting from the delay in transporting the item, outweigh the risks of carrying out site radiography.
- Where a contractor proposes to use either a cobalt-60 source (which is a high energy gamma source), or a source with an activity higher than listed in the table above for that type of source, the RPA must be consulted prior to the work commencing.
- The RPA must also be consulted where the contractor proposes to use a source type that is not listed, including X-ray equipment.
- If the work piece to be tested is portable, it should be taken to a dedicated area for radiography.
- The area used for radiography on Site must be described in Site-Specific Instructions for that Site. If the work piece is not portable, radiography must take place with the area down-manned as far as possible.
- If possible, the work should be carried out when other people are not around, for example, at night or at meal breaks.
- Flashing amber warning lights will be erected at all entrances to the Controlled Area.
- A flashing red warning light will be situated adjacent to the source exposure position while an exposure is underway.
- Warning signs will be erected around the Controlled Area indicating the radiation hazard e.g. "Controlled Area. External Radiation Risk. No Entry" and will include an explanation of the meaning of the warning lights e.g. "Amber Light: Radiation Imminent" and "Red Light: Radiation Exposure Underway"
- The Controlled Area must be thoroughly searched prior to any exposure.
- A horn or whistle must be sounded just before exposure. The significance of this warning must be indicated to the work force.
- The Contractor must provide two suitably calibrated radiation dose rate monitors.
- The Contractor must ensure that the source is back in its container at the end of the operation by checking with a suitable meter.
- An announcement will also be made when the work is completed.
- All sources must be returned to the radioactive substance store when not in use.

NB: Specific instructions for contractors involving incidents with radiography sources are included within the AzSPU Radiation Contingency Plan (AzSPU-HSSE-DOC-00086-2).

5.5 Work Instructions for Well Logging

Well logging is used extensively on AzSPU Installations to obtain petrophysical, geological and directional data.

The radioactive sources most commonly used in well logging tools are:

Source	Maximum Activity
Caesium-137	Up to 60 GBq
Americium-241/Beryllium	Up to 600 GBq

Additionally, some logging tools generate Pulsed Neutrons and incorporate around 60 GBq of hydrogen-3 (also called Tritium).

In addition to the General Work Instructions for Working with Ionising Radiation (Section 5.3), the following specific instructions are applicable:

- On occasion it may be necessary for workers who are not part of the logging crew to work within the Controlled Area e.g. a driller working in the dog-house during logging operations. In this instance the contractor will provide a written system of work for such individuals and make an assessment of the individual's radiation exposure. Details of the exposure will be passed to the Site RPS to record in a Radiation Exposure Log (Appendix E).
- Before any sources are run down hole, it must be ensured that there is free access for the logging equipment to prevent it from becoming trapped.
- The contractor must ensure that the logging tool is free from sand, clay or other dirt before the source(s) is installed in the tool.
- Remote controlled devices (e.g. handling tools) must be used when removing sources from shields and inserting into the down-hole tool.
- The Contractor must ensure that the source or sources have been loaded into the down-hole tool prior to leaving the drill floor by carrying out radiation monitoring in the area.
- When the source or sources are returned the logging engineer will carry out another radiation survey to ensure that the sources have been correctly loaded into the storage/transport containers.
- The above precautions also hold if a logging while drilling source is loaded and removed from the tool. On these occasions, the Controlled Area may go down through several decks as the sources are run into the well.

NB: Specific instructions for contractors involving well logging radioactive source incidents are included within the AzSPU Radiation Contingency Plan (AzSPU-HSSE-DOC-00086-2).

5.6 Work Instructions for the Storage and Use of Pip Tags

Pip tags, or depth correlation subs, are small sources that are inserted into the casing or tubing string at a known point. The string is then installed in the well. The pip tag then acts as a reference point for subsequent well logging.

Pip tags are usually Cobalt-60 sources. There are requirements over the control, storage, disposal and notification of loss of the sources. Whenever possible the source should be loaded into the collar or pup joint before transportation to the Site or rig.

In addition to the General Work Instructions for Working with Ionising Radiation (Section 5.3), the following specific instructions are applicable:

On receipt of the pip tag sources offshore they must immediately be taken to the source store and placed inside. The well logging contractor must have his own source store. If the pip tag is already installed in a collar or sub, it cannot be stored in the source store. The dose rate at the surface of the collar or sub will be measured. An assessment of the external radiation risk associated with the use and handling of the collar or sub must be carried out. If this risk assessment indicates potential exposure to any member of the workforce in excess of 1mSv per year, a supervised area must be established. If the dose rate exceeds 7.5µSv/h, a controlled area with a barrier must be set up at the 7.5µSv/h contour. Signs giving warning of the controlled or supervised area must be displayed in suitable positions indicating the nature

of the radiation sources and the risks arising from such sources. Details of the sources will be entered on the form in Appendix N Mobile Source Register.

If the source has to be loaded into the collar or pup joint on the Site/rig, it must not be touched by the fingers but handled using tweezers or tongs.

It is unlikely that a controlled area will be merited for pip tag work, but it is good practice to provide a supervised area when handling pip tags and to barrier and mark that area.

The area must be prepared before use to aid source recovery if dropped. Whenever possible, a tray (with a soft cover on) should be placed beneath the source loading area during the operation.

All sources must be returned to the store when not in use and the keys returned to the OIM.

Where milling operations are likely to mutilate or destroy a pip tag located down a well, this information must be immediately relayed to the AzSPU RP SPA and the RPA.

When the pip tag is installed in the well, the entry in the Mobile Source Register must be closed out, with the well no. in which the pip tag has been installed. It must then be entered in Appendix O Inaccessible Source Register. The position of any pip tags must be marked in the well file. Although not required by legislation it is also good practice to have their presence marked on the wellhead.

5.7 Work Instructions for Nucleonic Devices

Radioactive sources can be installed as part of nucleonic instrumentation for:

- Monitoring and/or controlling density of fluid flowing through pipelines;
- Monitoring and/or controlling liquid levels in vessels;
- Detecting interface between fluids of different densities such as water, oil and gas in vessels.

Nucleonic devices incorporate sealed sources of radioactive material that emit penetrating gamma radiation. The varying absorption of the emitted radiation by the medium under investigation and the subsequent detection of the attenuated radiation provides the basis of the measurement techniques.

In the case of level or density gauges the sources are usually housed in heavily shielded, secure steel and lead containers that are mounted onto vessels or pipes.

Some interface measuring / detecting devices are mounted with the source or a string of sources located inside a vessel in a dip pipe, with an external housing into which the source(s) can be withdrawn and shielded. The detector is also mounted external to the vessel.

For the above nucleonic devices, the type and activity of the source is determined by a number of process parameters including vessel wall thickness and distance from source to detector. Most nucleonic devices incorporate caesium-137 sources, but cobalt-60 is also used in some situations due to the higher penetrating power of the gamma rays emitted.

Density profiling instruments (the ‘Profiler’), used for density measurements through the depth of a vessel, use an array of americium 241 sources, which may extend to a few metres

in length. The sources are contained within a source rod housed in a titanium dip pipe. The device also incorporates an array of detectors in close proximity to the sources; there are no detectors external to the vessel. Due to the low energy of the gamma radiation emitted from americium-241, it is not normally possible to measure a dose rate on the outside of a vessel fitted with a profiler.

5.7.1 Management Arrangements

Site Management have the ultimate responsibility for ensuring that installed nucleonic devices are used in compliance with this procedure. This responsibility cannot be delegated to employees, workers, the radiation protection supervisor (RPS), the RPA, the AzSPU RP SPA, or anyone else.

All persons who may be affected by the content of these procedures should be made aware of the relevant details. Site management will enable a free flow of radiation protection and safety related matters between workers and management.

5.7.2 Critical Examination on Installation

Sections 5.2 and 5.3 must be applied in the case of Contractor's installing nucleonic devices. In addition, the following requirements also apply:

A critical examination will be carried out when a nucleonic device is either installed for the first time, or when any work is carried out on the device that could affect the safety aspects of the device. It is the responsibility of the Contractor installing the device to carry out the critical examination.

A site RPS will be present at the time of the Critical Examination to confirm the checks carried out by the installer and he will complete the Critical Examination Checklist (Appendix H). The RPS should ensure that the installer includes a check on the surface dose rate and the dose rate at 1m and records the results in the Critical Examination Report.

Once the RPS is satisfied that a gauge has been installed satisfactorily, he will countersign the Contractor's check-sheet to confirm that the checks have been carried out and that he agrees with the results.

The site RPS will also sign the relevant documentation to formally accept the transfer of ownership of the radioactive source(s) from the Contractor. The RPS will retain copies of the source transfer document, the Contractor's Critical Examination Report and his own Critical Examination Checklist. These will be retained in the Site Radiation Records.

5.7.3 Controlled and Supervised Areas

Controlled areas:

Controlled areas will be designated in accordance with the Radiation Protection Programme requirements (see Section 5.1.1).

In most situations it should be possible for the Company installing the nucleonic devices to ensure at the planning stage that the conditions requiring a designation of a Controlled Area will not be created.

In the event that a Controlled Area is required, the site RPS will contact the AzSPU RP SPA and RPA for further advice.

In addition, the dose rate at 1 m from a nucleonic device must not exceed 3 μSv/h and the dose rate on the surface of the device must not exceed 100 μSv/h.

During vessel entry operations, it will be necessary to designate a Temporary Controlled Area to allow access to the inside of the vessel, see Section 5.7.9.

Supervised Areas:

A Supervised Area will be designated around each installed nucleonic device to within 1 metre of the source housing and the detector.

Supervised Area signs are not required. Access to Supervised Areas will not normally need to be restricted.

5.7.4 Site Register of Installed Sources

The Site Manager is responsible for ensuring that an up to date Site Register of Installed Sources is kept; on a day-to-day basis this will be maintained by the RPS. The Register will be updated each time a new source(s) is installed on site or whenever a source(s) is removed from site, even temporarily. The Register forms part of the Site Radiation Records and is a controlled and auditable record. The Register must contain the following information for each source:

- Type of source (e.g. caesium-137);
- Source serial number (or other unique identification mark);
- Date of receipt (i.e. the date that the source was installed and ownership transferred);
- Activity of the source at the date of receipt or previously recorded date (manufacture);
- Current location of each source;
- For sources transferred from site, the date of transfer and the destination.

Additionally, a Site Map of Radioactive Source Locations, including source storage areas, will be compiled and maintained by the RPS. This will be shared with the ERT.

5.7.5 Source Accounting

An RPS or an Authorised Person will account for each installed radioactive source on a monthly basis. The purpose of the accounting check is to confirm that the source has not been stolen or tampered with. A visual check on the actual source would incur unnecessary exposure to the individual involved. Instead, the check will be carried out to confirm visually that the source holder is in place and padlocked and that the source holder and/or padlock have not been tampered with. For devices that are normally inaccessible, this check can be confirmed using binoculars.

The source accounting checks will be recorded on the Radioactive Source Accountancy, Monitoring and Safety Checks record form (Appendix I).

An inventory of radioactive sources for each site must be sent to MENR, MES and Ministry of Health before 15 December each year. The Permitting and Regulatory Affairs Adviser will be responsible for this, working with the AzSPU RP SPA.

5.7.6 Radiation Monitoring

The purpose of carrying out radiation monitoring is to demonstrate that radiation levels have not changed significantly and that the area designation has not changed.

The monitoring should demonstrate that the dose rates that are accessible do not exceed 3 μSv/h at 1 m from the source housing and 100 μSv/h on the surface. In addition, the dose rate at 30 cm from the source housing, detector or the surface of the vessel on which the nucleonic device is installed should not exceed 7.5 μSv/h and 75 μSv/h for hand or forearm access.

Radiation monitoring will be carried out around each installed source or nucleonic gauging device once a month, at the same time as the Source Accounting Check. Either the RPS or an Authorised Person using a suitable dose rate meter that has been tested within the last 12 months will carry out the check.

The radiation monitoring results will be recorded on the Radioactive Source Accountancy, Monitoring and Safety Checks Records Form (Appendix I) - the status of the shutter (i.e. open or closed) at the time of the measurements will be recorded.

5.7.6.1 Nucleonic Level Alarms

The dose rate will be measured on the source housing, at 30 cm from the housing and the detector and at 1 m from the source housing.

5.7.6.2 Interface Gauges

The source(s) is normally installed in a dip pipe inside the vessel, so the dose rate should be measured at 30 cm from the surface of the vessel, or the next nearest accessible point. The dose rate should also be measured at the detector.

5.7.6.3 Profiler Gauges

The sources are installed in a dip pipe inside the vessel. The americium-241 sources used in the Profiler gauge emit low energy gamma rays, which do not have enough energy to penetrate the vessel walls. It will not normally be possible to measure a dose rate outside the vessel. A check should be carried out to ensure that there are no elevated dose rates around the vessel or the device.

5.7.7 Maintenance and Safety Checks

5.7.7.1 Maintenance

Nucleonic gauges can be affected by the environment in which they are used, which may result in the radiation safety and protection of the gauge being adversely affected, for example, shielding may be degraded, shutters may stick, warning notices may become illegible, etc. It is therefore important that gauges are included in a routine maintenance schedule. Persons carrying out the maintenance work need to be aware of the radiation hazards and be appropriately trained.

5.7.7.2 Safety Checks

The RPS or Authorised Person will carry out the following routine safety checks at the same time as the source accountancy and radiation monitoring checks:

- Inspect the general condition of the nucleonic device for wear, corrosion etc. and to confirm that it is securely mounted.
- Check that the padlock on the source holder is still in place and is in good condition.
- Check that the source detail plate and warning sign on the nucleonic device and the warning signs on the vessel are still in place and in good condition.
- Check the condition of the shutter mechanism ensuring that the shutter has not been padlocked in the "OPEN" position and that the status of the shutter is clearly visible.

At least once a year, the operation of gauge shutters should be tested and sources installed in dip pipes should be isolated and de-isolated to ensure the continued safe operation of the devices; this should be carried out by the RPS or an Authorised Person, with the permission of the Control Room.

The results of these checks will be recorded on the Radioactive Source Accountancy, Monitoring and Safety Checks Record Form (Appendix I).

5.7.8 Leakage Testing

When a new radioactive source is purchased it should be supplied with a certificate confirming that it is free from contamination. Sealed sources used in nucleonic gauging devices must thereafter be tested for leakage at least once in every 24 months, or annually in the case of sources that are older than 15 years. Gauges that are used under harsh environmental conditions (e.g. high temperature, corrosive chemicals, and high levels of vibration) may need to be checked more frequently.

The purpose of the leakage test is to confirm that the source capsule is intact and that there is no leakage of radioactive material. Given that a direct test of the source capsule would cause a significant exposure to the person carrying out the test, an indirect method will be used instead. This involves wiping the external surface of any part of the gauge where leakage could reasonably be detected e.g. at the source holder / shutter mechanism.

The Site RPS or an Authorised Person who has received the appropriate training will carry out the test. Alternatively, the test may be carried out by the RPA during the annual audit.

The procedure for carrying out a leak test is given in Appendix J. Wipes should be sent to the AzSPU approved laboratory for analysis.

The certificate issued by the laboratory will require the signature of the person doing the wipe test to confirm that the swab was taken in accordance with the procedure. Where the wipe test is carried out by the RPA, the certificate will be signed by the RPA.

Copies of the leak test certificates will be maintained in the Site Radiation Records for a period of at least two years.

5.7.9 Entry to Vessels Fitted with Nucleonic Devices

During routine operating conditions it is not normally possible to access the internals of a vessel on which a nucleonic(s) is installed. However, during shutdown or maintenance activities, vessel entry may be required.

Prior to vessel entry, a Site RPS will isolate any sources that are installed on the vessel. This must only be carried out with the permission of the Area Authority. The isolation procedures for sources installed in dip pipes and for the Profiler sources are given in Appendices J and K,

respectively. In the case of level and density gauges, the sources can be isolated by simply closing the shutter on the source housing / container. The shutter should then be locked in the "SHUT" or "CLOSED" position using a padlock. The padlock key will be kept by the RPS until the source needs to be de-isolated.

The RPS is responsible for ensuring that the isolation procedure has been carried out and for reinstatement and signing the work permit and/or isolation control certificate as appropriate.

5.7.9.1 Temporary Controlled Area

The inside of the vessel is normally designated as a Controlled Area due to the potential for exposure to significant dose rates.

At the first opening of the man-way into the vessel, the RPS will confirm that the source(s) have been isolated by monitoring inside the vessel with an intrinsically safe dose rate meter. Provided there are no dose rates in excess of 7.5µSv/h, work can commence and the area can be de-designated. It is not necessary to record the dose to the RPS in this instance. If the dose rate is in excess of 7.5µSv/h, the RPS will withdraw and check that the source isolation procedure has been carried out correctly. It should be noted that an exposed source, or sources, would give rise to dose rates substantially in excess of 7.5µSv/h.

5.7.9.2 Naturally Occurring Radioactive Material (NORM)

If there is reason to suspect the presence of naturally occurring radioactive material in the vessel then a check must be carried out before entry to the vessel is permitted. If NORM is detected the AzSPU Procedure for Management of NORM (AzSPU-DOC-HSSE-00097-2) must be followed and a task based risk assessment carried out. It should be noted that NORM deposits could influence the dose rate measurement made above. A Controlled Area must be designated for entry to a vessel containing NORM.

5.7.10 Precautions for Vessels Incorporating Nucleonic Interface Gauges

During normal operations, the source is retained in a dip pipe inside the vessel and the fluids inside the vessel provide adequate shielding. If the liquid level inside the vessel falls, or is lowered, it is possible that radiation dose rates outside the vessel will increase; the dose rate that is likely to be present in the event of the loss of liquid level would be around 50 µSv/h. In this event, the Control Room Operator will instruct an Authorised Person or RPS to retract the source(s) into the shielded container and to lock the device in the "SHUT" position. The RPS will retain the key and will ensure that the source is not exposed until the fluid level has increased to the normal level.

For operational reasons it may occasionally be necessary to operate the gauge with the source exposed above the liquid level. In these circumstances the RPS must measure the radiation dose rate outside the vessel. If the dose rate exceeds 7.5 µSv/h then a Controlled Area should be designated and signs and barriers should be put in place.

5.7.11 Removal of an Installed Nucleonic Device

Under no circumstances may a radioactive source be removed from its shielded container.

Prior to removing an installed nucleonic device, the AzSPU RP SPA and the RPA must be consulted and a task risk assessment must be carried out.

If it is necessary to remove the device from the vessel, either temporarily or permanently, the RPO must ensure that the appropriate source isolation has been carried out and confirm this by checking with a dose rate meter. The container may then be moved to an appropriate storage location.

If the nucleonic device is refitted, the RPS will remove the padlock and open the shutter. The RPS will then monitor the area and confirm that the readings are consistent with those made during the critical examination. If they are not then the source(s) must be isolated, the area monitored and the AzSPU RP SPA and the RPA contacted.

5.7.12 Temporary Storage of Nucleonic Devices

To ensure the safety and security of the sources, a temporary storage facility should:

- provide adequate shielding;
- be physically secure (e.g. locked when not in use);
- not be used as a general storage area for other goods;
- be fire proof and not contain other hazardous materials (e.g. flammable liquids and explosive materials);
- be dry;
- be appropriately labelled (e.g. radiation trefoil and warning notices with the legend "RADIOACTIVE" in English, Azerbaijani and Russian).

When nucleonic devices are placed into temporary storage, a daily accounting check should be carried out by a RPS; and the Site Register of Installed Sources amended to reflect the change of location.

5.7.13 Source Disposal

As soon as a nucleonic device becomes redundant, i.e. when there is no foreseeable use for the device, arrangements should be made for its disposal and the AzSPU RP SPA and the RPA should be informed. The means of disposal will normally be return of the device to the supplier. The entire nucleonic device should be removed, in preference to just the source(s). However, if this is not practicable for operational reasons and only the source(s) is removed, then all warning signs should be removed from the device and a tag should be attached which indicates that the radioactive source has been removed.

The supplier should be contacted to arrange for personnel to decommission the device. This will require Sections 5.2 and 5.3 to be followed. Additionally, the AzSPU RP SPA and Permitting and Regulatory Affairs should be notified of the planned disposal and the intended change to the inventory of sources.

It must be ensured that the Contractor has the necessary Special Permit to carry out the work and any other permissions and export licences required to dispose of the source(s). It should also be ensured that the Contractor has made arrangements for onward shipping and where necessary, temporary storage.

On completion of the work the Site Register of Installed Sources must be updated to reflect the change in the source inventory and the source transfer documents should be added to the Site Radiation Records.

At no time should a BP employee remove a radioactive source from a nucleonic device.

6 Key Documents/Tools/References

This procedure shall, where appropriate, be used in conjunction with the following AzSPU procedures:

Document Number	Title of Procedure
AzSPU-HSSE-DOC-00097-2	AzSPU Procedure for the Management of NORM
AzSPU-HSSE-DOC-00086-2	AzSPU Radiation Contingency Plan
AzSPU-HSSE-DOC-00115-2	AzSPU Procedure for Transportation of Radioactive Materials.
AzSPU-HSSE-DOC-00083-2	AzSPU Procedure for The Import / Export of Radioactive Materials and Sources of Ionising Radiation
AzSPU-HSSE-DOC-00025-2	AzSPU HSSE Document Management Procedure
AzSPU-HSSE-DOC-00021-2	AzSPU HSSE Definitions
AzSPU-HSSE-DOC-00002-2	AzSPU SSOW Procedure for Control of Work
AzSPU-HSSE-DOC-00011-2	AzSPU Procedure for Deviations
AzSPU-HSSE-DOC-00060-2	AzSPU Procedure for Permit to Work
AzSPU-HSSE-DOC-00054-2	AzSPU Incident Reporting and Investigation Procedure
AzSPU-HSSE-DOC-00072-2	AzSPU Review/Revision Process for HSE Tier 2 Procedures – Terms of Reference (ToR)
AzSPU-HSSE-DOC-00063-2	AzSPU SSOW Procedure for Task Risk Assessment

Revision/Review Log

Revision Date	Authority	Custodian	Revision Details
20 October 2004	Alan McNulty	Abbas Islamov	Initial Issue
07 November 2008	Alan McNulty	Adalat Mammadov	Note: the next review/revision date is extended to 01.03 2009 **due to rescheduling**
05 December 2008	Yuliy Zaytsev	Adalat Mammadov	Authority position/name has changed to reflect org changes in HSE&TD as of December 1st 2008
24 June 2009	Yuliy Zaytsev (Safety & Compliance Manager)	Adalat Mamedov (Central Safety TL)	Next revision date extended to 15 July 2009 due to rescheduling
31 July 2009	Yuliy Zaytsev (Safety & Compliance Manager)	Niyaz Mamedov (HSE Systems/CoW Advisor)	Document substantially reworked with input from AzSPU's Radiation Protection Advisor and expanded to include the following: • AzSPU Ionising Radiation Policy. • Radiation Protection Programme. • Management of contractors working with ionising radiation. • Work instructions for site radiography, well logging, pip tags and nucleonic devices.

7th October, 2009	Yuliy Zaytsev (Safety & Compliance Manager)	Idrak Nazarov (HSE MS Team Leader)	Information regarding naturally occurring radioactive materials (NORM) has been removed from this procedure and incorporated into a separate AzSPU Procedure for Management of NORM (AzSPU-HSSE-DOC-00097-2). Information regarding transportation of radioactive sources has been removed from this procedure and incorporated into a separate AzSPU Procedure for Transportation of Radioactive Materials (AzSPU-HSSE-DOC-00115-2).
31st July 2010	Yuliy Zaytsev (Safety & Compliance Manager)	Idrak Nazarov (HSE MS Team Leader)	Thorough revision require additional consultation with AzSPU RPA, hence the document review requires to be extended
04th October 2010	Yuliy Zaytsev (Safety & Compliance Manager)	John Elliott (Senior HSE Advisor)	**Sub-paragraph 5.1.3.1 Monitoring of Workers** 3rd and 4th statement lines are updated **Appendix A** added new abbreviations **Appendix B** updated contact details information

Appendix A – Definitions & Abbreviations

Term	Definition
Absorbed Dose	Quantity of energy imparted by ionising radiation to unit mass of matter such as tissue. Unit gray, Symbol Gy. Replaced the rad as unit of absorbed dose. 1 Gy = 1 joule per kilogram. 1 Gy = 100 rads.
Activity	Measure of an amount of a radionuclide. Describes the rate at which transformations occur in it. Unit becquerel. Symbol Bq. 1 Bq = 1 disintegration per second.
ALARP	As Low As Reasonably Practicable. Means taking every reasonable effort to maintain exposures as far below the dose limits as is achievable, while taking into consideration the trouble, time and money needed to control it.
ALT	Azerbaijan Leadership Team
Alpha Radiation	Positively charged particulate radiation comprising 2 protons and 2 neutrons, emitted from some radioactive materials during radioactive decay. It has low penetrating power and short range (a few centimetres in air). Not considered an external hazard but materials that emit alpha radiation represent a significant internal hazard.
AzSPU	Azerbaijan Strategic Performance Unit
Becquerel	See Activity.
Beta Radiation	Negatively charged particulate radiation identical to an electron that is emitted from some radioactive materials during radioactive decay. Exposure to a large amount of beta radiation from external sources may cause skin burns. Beta radiation is also presents an internal radiation hazard. Thin sheets of low-density materials such as aluminium or plastic may stop beta particles.
CAM	Contract Accountable Manager
Classified / Category A Person	A Classified / Category A person is one who is likely to receive an effective dose in excess of 6 mSv per year, or an equivalent dose that exceeds three-tenths of any relevant dose limit. A Classified / Category A person should be informed if he/she is so designated. Classified / Category A persons should be over 18 years old and have a health record certified by doctor confirming they are fit for the job.
Contamination	The contamination by any radioactive substance of any surface (including the surface of the body or clothing) or any part of absorbent objects or materials or the contamination of liquids or gases by any radioactive substance.
Controlled Area	A controlled area is an area in which specific protective measures or safety provisions are or could be required for: • controlling normal exposures or preventing the spread of contamination during normal working conditions; and

	• preventing or limiting the extent of potential exposures.
cps	Counts per second
CTM	Compliance Task Manager
Curie	Former unit of Activity with symbol Ci. Replaced by the S.I. unit the Becquerel. 1 Ci = 3.7 x 10^{10} Bq or 37 GBq.
DC&I	Drilling, Completions and Interventions
Decay	The process of spontaneous transformation of a radionuclide. The decrease in activity of a radioactive substance.
Designated Area	Designated Areas include Controlled and Supervised Areas.
Disposal	In relation to radioactive waste, dispersal or emplacement in any medium without the intention of retrieval.
Dose	General term for a dose quantity such as absorbed dose, equivalent dose, and effective dose.
Dose Limit	Dose Limit in relation to persons of a specified class is the limit on effective dose or equivalent dose in relation to a person of that class.
Dose Rate	Dose Rate, in relation to a place, is the rate at which a person or part of a person would receive a dose of ionising radiation from external radiation if he were at that place.
Effective Dose	The quantity obtained by multiplying the dose equivalents to various tissues and organs by the tissue weighting factor appropriate to each and summing the products. Unit sievert, symbol Sv. Frequently abbreviated to dose.
ERP	Emergency Response Plan - Document describing the actions to be taken in the event of a radiation incident or emergency, the purpose of which is to restrict any exposure that arises from an accident both to the employees themselves and to others, including emergency services personnel, who may be affected by it. Also called Contingency Plan.
ERT	Emergency Response Team
Equivalent Dose	The quantity obtained by multiplying the absorbed dose by a weighting factor to allow for the different effectiveness of the various ionising radiations in causing harm to tissue. Unit sievert, symbol Sv. Replaced the unit rem. 1 Sv = 100 rems.
External Radiation	External radiation, in relation to a person, is the ionising radiation coming from outside the body of that person.
GBq	Gigabecquerel (10^9 Bq)
Gray	S.I. unit of Absorbed Dose. Symbol Gy.
Half Life	The time taken for the number of atoms in a radioactive material to decay to half the original value.
HSE	Health, safety and environment
IAEA	International Atomic Energy Agency
Internal Radiation	Internal radiation, in relation to a person, is the ionising radiation

	coming from inside the body of that person.
Ionisation	The process by which an atom or molecule acquires or loses an electric charge. The production of ions.
Ionising Radiation	Radiation capable of causing ionisation either directly or indirectly e.g. alpha and beta particles, neutrons, gamma rays and X-rays.
ISSOW	Integrated Safe System of Work
Site-Specific Instructions	Working procedures specific to a site where work with ionising radiation is carried out. These may or may not include an Emergency Response Plan.
LSA	Low Specific Activity. Term derived from transport legislation to describe material with low specific activity that could include NORM.
MENR	Ministry of Ecology and Natural Resources
MES	Ministry of Emergency Situations
MPPU	Major Projects Performance Unit
Non-ionising radiation	Radiation that does not produce ionisation in matter. Examples are ultraviolet radiation, light, infrared radiation, and radio frequency radiation.
NORM	Naturally Occurring Radioactive Material. In the oil and gas industry this is material that originates from reservoir rock that is associated with production, maintenance and decommissioning activities. Presents a risk to health and work with NORM and disposal of NORM waste must be carried out in accordance with the applicable legislation or standards.
OIM	Offshore Installation Manager
Overexposure	Any exposure of a person to ionising radiation to the extent that the dose received by that person causes a dose limit relevant to that person to be exceeded or causes a proportion of a dose limit relevant to any employee to be exceeded.
PPE	Personal protective equipment
PSCM	Procurement and Supply Chain Management
PTW	Permit to Work
PU	Performance Unit
PUL	Performance Unit Leader
rad	Former unit of absorbed dose. Replaced by the gray (Gy). 1 rad = 0.01 Gy.
Radiation	Energy in the form of waves or particles originating from radioactive materials or radiation generating equipment.
Radiation accident	Accident where immediate action would be required to prevent or reduce the exposure to ionising radiation of employees or any other persons.
RPA	Radiation Protection Adviser / Qualified Expert - Person or body

	appointed to give advice on radiation protection and compliance matters.
RPO	Radiation Protection Officer – All third party contractors are required to appoint a RPO to supervise their work.
RPS	Radiation Protection Supervisor - Person appointed to be responsible for day-to-day supervision of work with ionising radiation and to ensure that the radiation procedures and local rules are followed.
RP SPA	Radiation Protection Single Point Accountability
Radioactive	Exhibiting radioactivity.
Radioactive Waste	Material for which no further use is foreseen that contains or is contaminated with radionuclides at concentrations greater than levels set by the regulatory bodies.
Radioactivity	The phenomenon whereby atoms undergo spontaneous random disintegration, usually accompanied by the emission of radiation.
Radionuclide	A species of radioactive atom.
Rem	Former unit of Equivalent Dose. Replaced by the S.I. unit the sieverts (Sv).
RPA	Radiation Protection Advisor
SCSSIMP	State Committee for the Supervision of Safe Industrial and Mining Practices.
Sealed Source	Radiation source containing a radioactive material and constructed to ISO standards to prevent under normal conditions of use, dispersion of the radioactive material into the environment.
Sievert	The S.I unit of both equivalent dose and effective dose. The symbol is Sv. Sub multiples are milli Sieverts (mSv) and micro Sieverts (μSv). One millisievert is one thousandth of one sievert and one micro sievert is one thousandth on one millisievert.
SME	Subject Matter Expert
Source of ionising radiation	Radioactive substance or device emitting or capable of emitting ionising radiation
SPU	Strategic Performance Unit
SS	Safety Series
Supervised Area	Any area not already designated as a controlled area but where occupational exposure conditions need to be kept under review even though specific protection measures and safety provisions are not normally needed.
Unsealed Radioactive Materials	Radioactive material not in the form of a sealed source, e.g. gas, liquids or solid powder.
VP	Vice President
Written System of Work	A written method of work that permits non-classified workers who to enter a controlled area.

X-rays	Penetrating electromagnetic radiation similar in nature to gamma radiation but generated by electrical equipment.

Appendix B - Qualified Expert / Radiation Protection Adviser Contact Details

AzSPU has appointed Tracerco Radiation Protection Advisory Services as their Radiation Protection Adviser (RPA) (which is equivalent to the term Qualified Expert used by the IAEA and the EC).

The first point of contact is Donald Urquhart, who is based in the Tracerco office in Aberdeen, UK. However, all of the RPAs who are based either in the Aberdeen office, or the Tracerco Billingham office, are able to advise on any issues affecting BP.

Contact details:

Aberdeen RPAs	Email	Telephone
Donald Urquhart	donald.urquhart@matthey.com	+44(0) 01224 650658 (direct) +44(0) 07875 384225 (mobile)
Graham Wales	graham.wales@matthey.com	+44(0) 1224 650652 (direct) +44(0) 7764836669 (mobile)
Bill Good	bill.good@matthey.com	+44(0) 1224 650653 (direct) +44(0) 7801662320 (mobile)

Billingham RPAs	Email	Telephone
Andrew Smith	andrew.smith@matthey.com	+44(0) 1642375462 (direct) +44(0) 7764290567 (mobile)
Nick Hutchison	nick.hutchinson@matthey.com	+44(0) 1642375463 (direct) +44(0) 7919091388 (mobile)
Paul Warren	paul.warren@matthey.com	+44(0) 1642375461 (direct) +44(0) 7889828968 (mobile)

Emergency Contact Details:

If none of the above can be contacted outside normal hours then call +44(0) 1642 375500 and ask to speak to the duty RPA.

Postal Addresses

Aberdeen Office	Billingham Office
Tracerco Chattan Mews Office 18 Chattan Place Aberdeen AB10 6RD United Kingdom	Tracerco Technology Centre, Pavilion 10, The Moat, Belasis Hall Technology Park Billingham, Cleveland, TS23 4AZ, United Kingdom

Appendix C - Controlled Area Handover Certificate

Controlled Area Handover Certificate
The work described below is to be carried out in a AzSPU Controlled Area. This document is a formal record that responsibility for the Controlled Area is handed over to the Contractor named below and that the Contractor agrees to accept responsibility for ensuring compliance with any applicable legislation and local rules/radiation procedures.
Installation: _____ Contractor: _____ Work Location: _____ Description of Work: _____ _____ _____ _____ _____ Commencement: Date:_____ Time:_____ Completion: Date:_____ Time:_____
Signed: _____ Contractor RPO Print: _____ Date: _____
Signed: _____ AzSPU RPS Print: _____ Date:_____

Appendix D - Record of Entry into a Controlled Area

Date: _____ Site/Installation: _____

Work Location: _____

Name	Company	Time of Entry	Time of Exit	Duration (Hrs) [1]	Average Dose Rate (µSv/h)	Dose (µSv)	Free of Contamination?[2]	RPO Initials[3]

Notes. [1] The duration of entry into the Controlled Area should be recorded to the nearest 0.5 hrs
[2] All contamination must be removed before workers can leave the area
[3] RPS or appointed deputy

Appendix E - Radiation Exposure Log

The purpose of the form is to allow AzSPU to make reasonable estimates of the doses received by workers in AzSPU designated controlled areas. The form should be used for workers who do not normally work in controlled areas, but are occasionally required to do so. Workers who regularly work in controlled areas are subject to individual dose assessment and will normally wear individual dosimetry.

This record must be retained in the Site Radiation Records

RADILOGICAL EXPOSURE LOG		Name:					
		Company:					
		Company No.:					
		Calendar Year:					
Date	**Location**	**Time In**	**Time Out**	**Average Dose Rate (µSv/h)**	**Dose (µSv)**	**Accumulated Dose (µSv)**	**RPS**

Appendix F - Radiation Monitoring

Introduction

The aim of this procedure is to give guidance on the proper use of radiation monitoring instruments and the correct interpretation of results.

The radiation detection and measuring instruments are divided into two categories i.e. contamination monitors and dose rate monitors.

Contamination monitors are used to detect and measure surface contamination i.e. radioactivity on a surface or in a material. The monitors can be used to detect natural radioactivity in materials i.e. Naturally Occurring Radioactive Material (NORM).

Dose rate monitors are used to measure the gamma dose rate arising from a source of radioactive material or a radiation generator. The material may be in the form of a sealed radioactive source such as a radiography source or a nucleonic source. Dose rates can also sometimes be measured from NORM with a high specific activity and generally where there are significant quantities of NORM, e.g. in a separator vessel or near bundles of contaminated pipe/tubing.

Personnel

Only personnel who have received appropriate training may carry out radiation monitoring. Appropriate training will include attendance at a RPS course, a NORM Awareness course, or on the job training by the RPS. A record of on the job training will be kept by the Site RPS in the Site Radiation Files or referenced therein.

Contamination Monitors

Contamination monitors typically incorporate a ratemeter and a detector. The detector type determines the type of radiations that can be measured. The most common types of detectors used to detect and measure NORM contamination are end window Geiger Mueller detectors and scintillation detectors.

Monitors that use end window Geiger Mueller detectors are suitable for measuring alpha and beta radiation, but are also sensitive to gamma radiation. Monitors that include probes with Geiger Mueller detectors include the Tracerco T201 Monitor and Mini Monitor Series 900 rate meters with EP15 and EL probes.

Scintillation detectors are designed to detect specific types of radiation. Some detectors are suitable for measuring only gamma radiation e.g. a Mini 900 Series Monitor with a 5.44A, or 44B probe. Other detectors are suitable for measuring alpha, beta or, in the case of a NE PCM 5/1 ratemeter with DP2 probe, alpha and beta radiation.

It should be noted that the only monitor in common use that is **intrinsically safe** is the Tracerco 201.

All of these instruments register in counts per second (cps). Unless done by the monitor, calibration data is required to convert counts per second into Becquerels per square centimetre (Bq/cm^2) surface contamination. The conversion factor for particular radionuclides is found on the instrument test certificate and sometimes on the instrument body.

The T201 is also calibrated in Bq/cm^2 for selected radionuclides such as Radium-222 and Lead-210, both in the wet and dry state. The monitor can be set to provide a direct readout in Bq/cm^2 for a selected radionuclide, while the analogue display reads c.p.s.

Checking a contamination monitor against a test disc

After each time a monitor is calibrated/tested, the RPS will check the response of the monitor to the test disc and record the result in the Contamination Monitoring Log. If subsequent checks against the test source deviate by 20% or more from this baseline value then the monitor should be sent for retest.

Pre-use Checks and Function Tests

Prior to carrying out any measurements, the following checks must be carried out:

- Prior to switching on, check the zero setting (analogue displays only) i.e. ensure the needle sits on 0.
- For instruments with a H.V. setting, check that the setting corresponds to the setting on the test certificate.
- Check the meter and probe (especially the detector) for signs of damage
- Ensure the instrument is in calibration i.e. it has been tested in the last 12 months and there is a valid test certificate
- Where applicable, ensure that the rate meter and probe combination is as stated on the test certificate
- Switch to the 'battery check' setting (the T201 performs a self check) and leave for 20s. If the needle starts to drop back then replace the battery following the manufacturers instructions.
- Remove any protective caps from the detector and check the response to a test source is within 20% of the value after retest and record the result on the Contamination Monitoring Log in the Procedures for Work with NORM.

Contamination Monitoring

- Carry out and record a background check. This should be carried out away from sources of radiation and should normally be no more than a few c.p.s.
- Angle the detector face as close as possible to the surface being checked.
- Hold the face of the detector approximately 2mm away from the surface, taking care not to contaminate the detector by touching the surface.
- Move the probe slowly e.g. 25mm/second, across the surface taking care not to damage the window of the detector on any sharp objects.
- To determine whether a monitor is detecting contamination on an external or internal surface of an item, the plastic cap should be placed on the detector. If the reading decreases, then there is external contamination present. If there is no cap available then another suitable absorber could be used e.g. a piece of plastic, a few mm thick.

NORM contamination is considered to be present where there is a sustainable rise above the instrument's normal background.

General Points on Use

- Keep the monitor clean particularly the probe face, where deposits of contaminated material may increase the monitor's normal background. Take great care when attempting to clean the face of a probe.
- Renew batteries before the indicator falls into the 'low battery' area

- With detachable probes, ensure the connection is tight and the cable cannot be kinked or caught in obstructions.
- Contamination monitors that are **not** intrinsically safe should not be used in an area where recently broken containment has taken place. If a risk of flammable material is present, a sample of the contaminant should be removed from the vessel and measured outside the area of risk.

Dose Rate Monitoring

Dose rate monitors are generally used to measure gamma dose rate. Neutron monitors are also used where neutron sources or neutron generators are used.

The dose rate is the rate at which a dose of radiation is received over a given amount of time. The unit of dose is the Sievert (Sv), however, as this is a very large dose, dose rate meters usually measure micro Sieverts (μSv) or milli Sieverts (mSv). The unit of dose rate is therefore usually expressed in micro Sieverts per hour (μSv/h) or milli Sieverts per hour (mSv/h).

Typical dose rate meters include the Gammatrol PRI-190 or the Tracerco T202, which measure gamma radiation dose rate, both of which are intrinsically safe.

Pre-use Checks and Function Tests

- Prior to switching on, check the zero setting (monitors with analogue displays only) i.e. ensure the needle sits on 0.
- Check the monitor for signs of damage
- Check the battery (self test carried out by the Gammatrol and T202)
- Ensure the instrument is in calibration i.e. it has been tested in the last 12 months and there is a valid test certificate

Dose rate monitoring

- Switch on, away from sources of radiation if possible
- If applicable, select the lowest (i.e. most sensitive) range, which is usually 0-10 μSv/h
- Carry out a measurement with the front of the monitor pointed at the source of radiation
- Move the monitor around slowly to observe any increase or decrease in measurement
- Change the range if necessary
- Record the result

General Points on Use

- Renew batteries before the indicator falls into the 'low battery' area
- Measurements of dose rate around nucleonic devices should be made at approximately 30 cm from the nucleonic, the detector or from vessel walls; this measurement indicates the 'whole body dose rate'.
- Measurement of dose rate at closer than 30 cm is generally an indication of the dose rate for extremities e.g. hands and forearms.

Appendix G - Site Radiation Monitoring Equipment Register

Insert Site details here has the following radiation monitoring equipment:

DOSE RATE MONITORS

Make	Model	Serial Number	Location	Last Tested	Reason for Test (e.g. Routine)	Re-test Due	Comments

CONTAMINATION MONITORS

Make	Model	Serial Number	Location	Last Tested	Reason for Test (e.g. Routine)	Re-test Due	Comments

MONITOR TEST DISCS / SOURCES

Type	Activity	Serial Number	Location	Leak Tested	Next Test Due	Comments

Appendix H - Critical Examination Checklist

The following checklist will be completed by the Site RPS prior to accepting handover of responsibility for a nucleonic gauge from the Contractor installing the gauge.

Checklist	Yes	No
Is the gauging device securely mounted?		
Is the source housing mounted such that it is not possible to get access to the primary radiation beam?		
Does the source housing contain a radiation trefoil sign?		
Is there a source detail plate fixed to the source housing?		
Does the source detail plate contain details of source type (i.e. radionuclide), source activity and serial number?		
Do the source serial number and activity details match those in the Contractors source documentation?		
Where appropriate, is the source holder secure and padlocked in place?		
Where appropriate, does the shutter mechanism operate satisfactorily?		
Is the shutter status (i.e. 'open' or 'closed') clearly indicated?		
With the source(s) exposed, are accessible dose rates less than 7.5 μSv/h for whole body exposure (i.e. at 30 cm from source container, the vessel and the detector) and less than 75 μSv/h for exposure to hands, forearms or feet? Also, is the dose rate at the surface of the source housing less than 100 μSv/h and less than 3 μSv/h at 1 m (Ref. [7], Clauses 2.5 and 4.5)		
For vessel-mounted (as opposed to pipe-mounted) devices, are radiation-warning signs posted at all entrance points to the vessel?		
Is a Leakage Test Certificate available for the source(s) and has the source(s) been tested in the last two years?		

Comments

Checks carried out by: Name: ……..

Signature: ……..

Date: ……..

Completed forms should be field in the Site Radiation Records

Appendix I - Radioactive Source Accountancy, Monitoring and Safety Checks

Source Type:	
Activity:	
Serial No.:	

Location:	
Use:	
Instrument I.D.:	

Date	Max. Dose Rate (μSv/h)[1]		Shutter Open / Closed[3]	Condition of Gauge[4]	Warning signs[5]	Comments	Signed
	Housing[2]	Detector[2]					

NOTES

1. **Measurements should only be carried out by person(s) who have received appropriate training; this is not necessarily the RPS.**
2. If a measurement cannot be made at the housing or detector, then record the location that the measurement is made under "Comments".
3. The status of the shutter when measurements are made should be recorded i.e. either open or closed. Alternatively, if the source (or sources) is located in a dip pipe then record whether it is retracted or not.
4. Check for signs of wear and tear or damage: if maintenance is required then record this under "Comments".
5. Check warning signs on the gauge and on the vessel entry points. This should include a check on the source detail plaque and on the shutter status indication.

Appendix J – Leakage Test Method

The RPS, or an Authorised Person who has received appropriate training, will carry out the test. Alternatively, the test may be carried out by the Radiation Protection Adviser (RPA) during the annual audit.

The leakage test does not require direct access to the source. At no time will the source or source holder be removed from the source container.

Kit required

- Swabs and tubes supplied by Tracerco (N.B: As an alternative to the Tracerco swab, a small piece of cotton wool and a re-sealable bag may be used).
- Small container of water or isopropyl alcohol e.g. 100ml.
- Re-sealable bag.
- Pen.
- Disposable gloves.
- Contamination monitor.
- Radiation dose rate monitor.

Procedure

Carry out radiation dose rate measurements around the source housing to ensure that whole body dose rates are less 7.5 µSv/h and extremity (hands, feet and forearms) dose rates are less than 75 µSv/h.

Put on the gloves and then moisten a swab with water. Wipe the moistened swab over all areas that could reasonably be expected to reveal any leakage of the source i.e. at the shutter mechanism and where the source holder is fitted into the source container.

For interface gauges, the rear cap should be removed and a wipe made where the wire or source rod passes through the shutter mechanism. (The same wipe can be used). For Profiler gauges a wipe should be made where the source control handle fits into the gauge.

The swab should then be placed into the small plastic tube and the tube sealed. The tube should then be placed in the plastic bag. The bag should then be sealed and the contents should be checked for gross contamination using the contamination monitor on the c.p.s setting.

Assuming no contamination is found (if contamination is found, follow the procedures overleaf) the gloves may be removed. The bag should be marked with the following details:

- Date.
- Radionuclide.
- Identification of the source or sources (in the case of a Profiler gauge the gauge number may be used as an identifier).

The ‘Request For Analysis Form’ and the ‘Request for Leak test Analysis Form’ on the Tracerco website (http://www.tracerco.com/products-rpa-radiochemicalanalysis.htm) should be completed and the forms and wipes sent to the Tracerco laboratory:
Chris Pollin / Karen Waterman, Tracerco (Pavilion 10), PO Box, Belasis Technology Park, Billingham, Cleveland, TS23 1LB, UK.

Procedure in the event of contamination being detected

- Do not panic. Assume that the person performing the leak test may be contaminated, although this is highly unlikely.
- Summon help to inform the RPS immediately.
- The RPS should initiate the contingency plans for leaking source (see AzSPU Radiation Contingency Plan, AzSPU-HSSE-DOC-00086-2).
- Seal the wipe within another bag to minimise the risk of spreading any contamination.

Appendix K – Procedure for Isolating and De-isolating Sources in Dip-pipes

Isolation and De-isolation kit

A 4mm Allen (Hex Head) Key
B Retaining Padlock, Pin or Wire (to pass through 3/16" holes in source capsule and containment plate)
C Padlock for shutter mechanism (usually small D4)
D Radiation Dose Rate Monitor.

Radioactive Source Isolation Procedure

1. Remove the rear cover by unscrewing the four Allen (Hex Head) screws; retain the screws.
2. Pull the end of the extension rod/cable (which will be ill be visible in centre of containment plate) to its full extent (NOTE: rod/cable will be at vessel operating temperature - wear gloves). The source capsule cannot be withdrawn past the containment plate.
3. Close the shutter by pushing in or turning to "CLOSED" position. Padlock shutter mechanism shut at this point using item C (above).
4. 3/16" dia. holes in source capsule and retaining lug on containment plate should be aligned. Place item B (above) through these holes.
5. Unscrew extension rod/cable from source capsule and retain for future use.
6. Replace the rear cover using the 4 Allen (Hex Head) screws.
7. Use the Radiation monitor to observe radiation levels both at the source head and detector. No radiation should be detected at the detector after the source has been retracted into the source head.
8. Add notice to shielded container indicating source isolation.

Note! All padlock keys and extension rods/cables should be kept in a secure or controlled system. Extension rods should be labelled to identify the gauge that they have been removed from.

De-isolation Procedure

DO NOT UNLOCK OR OTHERWISE ADJUST THE CONTAINER SHUTTER MECHANISM BEFORE STEP 5 BELOW.

1. Remove the rear cover by unscrewing the four Allen (Hex Head) screws; retain the screws.

2. The end of the radioactive source connector will be in view. It will probably be locked using a small padlock (item B) to a small locking tab attached to the capsule containment plate. If a lock is not used, the capsule may be loosely wired to the locking tab. DO NOT remove the padlock or fixing wire yet.
3. A rigid extension rod or flexible cable assembly is used to correctly position the source capsule at the end of the internal dip-pipe in the vessel. This rod/cable will have been removed when the source was isolated; it should be labelled to identify the gauge to which it fits. Attach this rod or cable assembly to the threaded rear of the source connector, making sure that it is tightly screwed into position. It is quite safe to touch the end of the source connector.
4. Unlock and remove the padlock or fixing wire attaching the source connector to the containment plate.
5. Unlock and remove the padlock (item C) holding the shutter mechanism in the SHUT position. Pull or rotate the shutter mechanism to the 'OPEN' position (the method of opening the shutter depends on the shielded container type). This removes an internal shield (item 2) within the shielded container and allows passage of the source capsule into the vessel dip-pipe. The shutter may be wired (NOT locked) in the open position to prevent accidental closure.
6. Push the extension rod/cable gently so that the source capsule enters the vessel dip-pipe. Ensure that the source assembly does not catch any internal edges within the dip-pipe. Move the source assembly gently back and forth if this happens so that any internal obstructions are bypassed. When in the correct position, the source capsule should touch the end of the internal dip-pipe and cannot be pushed further into the dip-pipe (a slight flexing will be encountered if flexible cables are used. The assembly should reach a "rest" position with the source capsule at the end of the dip-pipe). Once in position, approximately 50mm of extension rod should protrude at the rear of the shielded container.
7. Replace the rear cover using the 4 Allen (Hex Head) screws. The back cap will ensure that the entire assembly is held securely in the correct operating position. Extension rods/cables are cut to length at commissioning to ensure this.
8. Add notice to shielded container indicating source condition (de-isolated).

Appendix L - Procedure for Isolating and De-isolating Profiler Sources

Isolation and de-isolation kit

- Padlock and key
- Soft Fastening e.g. tie wrap

Isolation Procedure

1. Push down on the lever on the neck of the profiler to the indicated 'closed' position. This action brings the sources behind a shield, thereby reducing the surface dose rate on the internal dip pipe.
2. Insert a padlock in the hole provided and lock it.

Comments

Complete closure must be confirmed on vessel entry by the use of an appropriate radiation monitor

This padlock and key will be securely retained

NOTE! The source isolation lever should never be locked in the ‘open’ position. A ‘soft’ fastening, such as a wire or clip could be used to prevent inadvertent closure.

De-isolation Procedure

1. Remove padlock
2. Raise the lever on the neck of the profiler to the indicated ‘open’ position.
3. Apply soft fastening if required.

Appendix M - Contractors Checklist for Contractors Using Radioactive Materials on AzSPU Sites

Site Name: _____

Contractor: _____

Contractor Address: _____

_____

Contractor's RPA: _____

_____

Contractor's Site RPO (RPS): _____

Nature of work: _____

_____

_____

Source type: _____

Serial No.: _____

Activity: _____

Source Storage Location: _____

_____

Checklist	Yes	No	N/A
Is the transport container in good condition?			
Is the container labelled properly?			
Do the measured dose rates correspond to the transport labels?			
Does the Contractor have a valid Special Permit for work with this type of radiation and is it available?			
Are there sufficient RPOs for the work?			
Do they have adequate dosimetry?			
Are there Radiation Procedures and / or Local Rules available?			
Are Emergency Response Plans available?			
Is the equipment listed in the emergency kit available and operating?			
Are suitable and sufficient Controlled Area signs available?			
Are sufficient barrier materials available?			
Are radiation-monitoring instruments appropriate to each type of radiation to be used available? • Gamma Dose Rate Meter (x 2 for radiography) • Neutron Dose Rate Meter • Contamination Meter			
Are the instruments functioning?			
Are test certificates available for the meters?			

Checklist	Yes	No	N/A
Does the Contractor have documentation with details of the source(s)			
Are there current leak test certificates available for all sources?			
Does the Contractor have a source movement / accounting record?			

Signed AzSPU RPS _____

Print: _____

Date: _____

If the answer to any of the above is "**No**" then the OIM should be notified and alternative arrangements must be made that provide the same level of control or safety. The OIM will decide whether or not to allow the work to go ahead and record his decision below, noting any alternative arrangements that have been made. The AzSPU Radiation Protection (RP) SPA and the Radiation Protection Adviser (RPA) should be contacted for advice if necessary.

OIM Comments:

Signed AzSPU (OIM): _____

Print: _____

Date: _____

Appendix N - Site Mobile Source Register

Site / Installation: _____

Ref No.	Service Company	Source Arrival Date	Nuclide e.g. ^{137}Cs	Activity (MBq)	Physical form e.g. sealed, gas, liquid	Source Serial Number or I.D.	Storage Location	Source Transfer Date	Transferred to? e.g. beach, well number, rig transfer[1]	Signed	Audit Date

Note.
1. If any mobile sources such as well logging or depth correlation markers are left in a well, details should be recorded here and then added to the Site Inaccessible Source Register.

Appendix O - Site Inaccessible Source Register

Site / Installation: _____

Ref No.	Service Company	Date Source Became Inaccessible[1]	Nuclide e.g. ^{137}Cs	Activity (MBq)	Physical form e.g. sealed, liquid	Source Serial Number or I.D.	Location of Inaccessible Source[2]	Signed[3]	Audit Date

Note. 1. The corresponding record in the Site Mobile Source Movement Register must be completed

2. Insert details of the location where the source is installed. For abandoned logging sources, well number, sidetrack number, depth. For other sources, as much information as possible

3. In the case of abandoned logging sources, the register should only be signed once a wellhead notice indicating the presence of down-hole sources is in place.

Appendix P

References

- Azerbaijan Republic Law on Public Radiation Safety No 4231Q as of January 30, 1997
- International Atomic Energy Agency in Safety Series 115, Radiation Protection Convention, 1960
- Resolution No. 134 On approval of the Rules on Form and Completion of Radiological-Hygienic Passports of Territories, Enterprises and Organisations and the Rules of Recordation and Control Over Individual Ray Doses, August 25, 1999
- The Cabinet Of Ministers Of The Azerbaijan Republic Decision No. 10 Baku City, 27 January 2000 On Approval of the Rules for Carriage of Dangerous Goods by Road
- Law of the Azerbaijan Republic, № 913-IГ. On joining the European Agreement (30 September 1957)on the International Carriage of Dangerous Goods by Road (ADR) and the Protocol on signing it
- Cabinet of Ministers of the Azerbaijan Republic Resolution No 75 On approving the Regulations for transportation of hazardous goods by maritime transport
- International Air Transport Association technical Instructions for the Transport of Dangerous Goods by Air (IATA), 2009
- International Maritime Dangerous Goods Code (IMDG), 2009 (with the amendment of 34-08)