Please consult the asset’s HSE instructions for potential installation specific requirements
1 GENERAL

Purpose
The purpose of this directive is to contribute to ensure that all work with, as well as transport and storing of
• radioactive sources and other radioactive material
• radioactive pollution and radioactive waste
• explosives
• cuttings, production fractions and hazardous and general sorted waste is carried out safely and in accordance with the regulations

Domain
This directive applies to
• all Ula, Valhall and Skarv and contracted installations on the Norwegian continental shelf
• the supply base and other land-based activities which involve handling hazardous and general waste generated
• Owners of contracted installations who have a system that satisfies the requirements in this directive may use their own system provided this has been clarified upon implementation
• Onshore facilities or projects where actual installations have a particular responsibility and which are assessed being part of the petroleum activities

References
• The activities regulations
  § 37 Radiation
  § 66 Use and discharge of chemicals
  § 68 Discharge of sand, cuttings and solid particles
  § 69 Discharge from formation testing and well cleaning
  § 72 Waste
• The facilities regulations
• Regulations relating to hazardous waste
• Regulations relating to classification, marking, packaging of chemical substances and chemical preparations.
• Regulations relating to treatment of explosive goods
• Guidance to the regulations relating to treatment of explosive goods, section 10 Use
• Regulations relating to radiation protection and use of radiation
• The Norwegian Radiation Protection Authority
• Norwegian Maritime Directorate regulation for vessels
• Below are relevant guidelines/publications:
  • Guidance no 9 – industrial control sources
  • Guidance no 1 – industrial radiography
  • Guidance no 13 – radioactive pollution and radioactive waste from the petroleum industry
• 054 Guidelines for work involving low specific activity scale and contaminated objects The Norwegian Oil & Gas Association’s recommended guidelines
• 093 Recommended guidelines for waste management in the offshore industry The Norwegian Oil & Gas Association’s recommended guidelines
• IMDG codes (rules for transport of hazardous goods by sea)
• ADR codes (rules for transport of hazardous goods by road)
• 0.60.016 Working environment manual
• 0.60.033 Environmental manual
• HSE Directive no. 1 Work permits
• HSE Directive no. 7 Chemicals
• MARPOL, Annex II

Definitions and abbreviations
• Responsible contractor/operator has authorisation to perform industrial radiography (NDT), use open sources and perform well logging using radioactive sources or explosives

• Local radiation coordinator are persons on Ula, Valhall and Skarv with radiation competency that shall coordinate all use of radioactive sources and material on the assets

• Central radiation coordinator is a position onshore that coordinates all activities towards Norwegian Radiation Protection Agency

• Assistant is a person who assists the operator during the performance of industrial radiography

• Portable radioactive sources are instruments containing control sources and which are normally moved between different places of use, e.g. for industrial radiography (NDT), well logging, open source (tracer), etc

• EAL - European waste list is a list for classification of waste in EU/EEA countries

• Hazardous waste is waste which cannot be handled together with consumer waste because it may lead to serious contamination or harm to people or animals

• Permanently installed radioactive sources are instruments containing control sources which are not normally moved, e.g. level gauges

• Assistant is a person who assists the operator during the performance of industrial radiography

• HSE evaluation of explosives means evaluations of health, safety and the environment in connection with use requirements and precautions for storage, transport, use and possible waste handling

• Planner is a person located onshore or offshore who considers the need for and plans the use of radioactive sources/materials and explosives

• Radioactive pollution and radioactive waste are concentrated natural occurring radioactive substances in produced water or in used equipment or in waste that has been cleaned out from process equipment with activity over the limits.
2 Responsibility

Offshore installation manager (Company rep. on contracted installations) is responsible for
- ensuring that all handling, use, logging, transport and storage of radioactive sources, other radioactive material and radioactive pollution/waste is carried out safely and in accordance with the regulations

Local radiation coordinator is responsible for
- ensuring that all handling, use, logging and storage of radioactive sources and other radioactive material is carried out safely and in accordance with the regulations
- that the Checklist for permanently installed control sources is completed and available on request
- keeping an overview of all radioactive sources and permanent and temporarily placed explosives on the installation
- ensuring that the necessary metering equipment for radioactive pollution/waste is available, calibrated and ready for use
- performing the necessary measurements of radioactivity before, during and after work with radioactive pollution/waste, and logging/reporting the measurement result using the Registration of work with radioactive scale.
- ensure that information on all permanent and temporary installed radioactive sources on actual installations are performed according to legislation

Area Authority is responsible for
- keeping an overview of all radioactive sources plus permanently and temporarily installed explosives on the installation
- ensuring that personnel who are to work with radioactive pollution/waste are familiar with elements of risk and the precautions applying to such work
• ensuring that all fractions from the production, including re-injected radioactive waste, are documented

**Planner**
is responsible for
• planning all use of radioactive sources, including evaluating the required intensity and alternative methods
• ensuring that permanently installed control sources are installed in accordance with the regulations
• ensuring that necessary protective equipment and packaging/containers for storage are available
• planning and evaluating the use of explosives based on a technical evaluation and HSE evaluation of the relevant explosives
• planning safe treatment of any hazardous waste when planning and carrying out work operations

**Responsible contractor/operator**
is responsible for
• ensuring that all handling, use, logging, transport and storage of own radioactive sources is carried out safely and in accordance with the regulations
• that the performing personnel have the required skills in accordance with the regulations
• ensuring that all handling, storage and use of explosives take place in a safe manner and in accordance with the regulations

**Drilling supervisor** (SIMOP leader if drilling supv. is not onboard)
is responsible for
• all storage and use of explosives on the installation are done according to legislation and local requirement for the specific installation
• ensuring that all personnel handling and using explosives are qualified to do so in accordance with the regulations
• ensuring that the explosives inventory on the installation is up-to-date
• ensuring documentation of all radioactive waste from well operations which is re-injected

**Central radiation coordinator**
is responsible to:
• contact with National Radiation Protection Authority
• coordinating work/applications to the National Radiation Protection Authority

**Performing personnel**
are responsible for:
• handling and collecting any hazardous waste on completion of the job in question as stipulated in the instructions and directive
• follow safety instructions when working with radioactive sources and scale.
• When disassembly radioactive equipment/waste the installations HSE Site Lead shall be notified for measurement and labelling of it.

Storage supervisor
is responsible for:
• storing, packaging/labelling, declaring and sending waste to the supply base in accordance with regulations and directives
• when disassembly radioactive equipment/waste the installation’s HSE Site Lead shall be notified for measurement and labelling of it.

Supply base
is responsible for:
• receiving and checking all waste and hazardous goods to and from the different installations
• sending on hazardous waste to the hazardous waste contractor
• informing the installation prior to shipment of radioactives and explosives

Hazardous waste contractor
is responsible for:
• handling all hazardous waste received in accordance with the regulations
or
• forwarding such waste to a final receiving station

Health Adviser
is responsible for
• keeping and handing out personal dosimeters for registration of radiation doses
• collecting personal dosimeters after use, registering the results on the Registration of exposure form and sending the form to the HSE department
• In some cases the responsible contractor/operator will be responsible for these actions

3 RADIOACTIVE SOURCES

General requirements
• All use of radioactive sources must represent a better, more economical and less risky alternative than use of alternative technology.
• When using radioactive sources, the extent of use, exposure time and radiation level must be reduced to the extent practically possible
Procedures and emergency response plans

• Whenever permanently installed radioactive sources are used, the Local radiation coordinator at Ula, Valhall and Skarv shall make sure that the following is in place:
  o emergency response plans for actions and follow-up of radiation accidents
• Whenever permanently installed radioactive sources are used, the responsible contractor inspectors shall ensure that the following is in place:
  o instructions for the person in charge of radiation protection and the operator
  o procedure for use of radioactive sources
• Any loss of or accident involving radioactive sources and other radioactive material shall be reported and handled in accordance with the installation's emergency response plans

Approval

• Work with radioactive sources requires
  o approved work permit level 1
  o approved work procedure or Safe Job Analysis (SJA)

Safety precautions for work with radioactive sources

• When planning the work, necessary actions shall be taken against radioactive radiation in accordance with the regulations
• The work site and necessary adjacent areas where the radiation may exceed 7.5 μSv/h shall be sealed off/marked with approved signs indicating radiation danger.
• Information of sealed off area due to working with radioactive sources shall be given over the PA equipment
• The performing technician and assistant shall be familiar with procedures, risks, safety measures and emergency response plans for working with radioactive substances
• The work must be coordinated with CCR/area technician
• The performing technician and assistant must be equipped with a dosimeter

All work with radioactive sources must be carried out with as little personnel activity in the area as possible

Required qualifications

• Well logging company shall hold a permit issued by the the Norwegian Radiation Protection Authority All users of portable radioactive sources shall have the competence specified in the authorisation from the Norwegian Radiation Protection Authority in order to obtain the competency required, normally a three-day-course is sufficient
• Personnel repairing or performing maintenance on equipment where there is a danger of exposure to radioactive radiation shall be certified by the Norwegian Radiation Protection Authority or an accredited personnel certification institute for radiation protection
• The Local radiation coordinator shall have undergone a radiation course with at least 3 days duration. The person shall also be able to guide workers on how radioactive sources shall be handled and what is the proper PPE equipment.

Storage
All radioactive sources and other radioactive material shall be stored in safe and clearly marked places when not in use
• The radioactive material store shall:
  o satisfy the requirements in the Norwegian Radiation Protection Authority’s regulations
  o be kept apart from other stores, such as stores for gas bottles, chemicals, explosives, corrosive or pyrotechnical material.
  o be locked and the key kept by a responsible person appointed by the OIM. The key must only be handed out to personnel with the competence specified in the regulations relating to radiation protection.
• Radioactive sources and other radioactive material permanently taken out of service must not be stored but returned to the dealer or an approved storage site

Requirement for information about stored radioactive sources
• The following information shall be registered for all radioactive sources onboard the installation
  o date of arrival
  o storage site
  o any accidents or problems with the source
  o possible date for sending the source ashore

Transport
• Radioactive sources are to be transported in line with the applicable Norwegian regulations and the ICAO and IMDG rules
• The sender and supply base shall inform the HSE Site Lead (Comapny rep. on contracted installations) and the operator before sending out any radioactive material
• The storesman/inspector on the installation shall inform the HSE Site Lead when:
  o radioactive sources are expected on the installation
  o radioactive sources have been received on the installation
  o radioactive sources have been sent ashore from the installation
4 EXPLOSIVES

General requirements
• Explosives and detonators must be kept in separate containers approved for this purpose until connected immediately prior to use
• Explosives must not be used under water when there are divers in the sea
• Any loss of, or accident involving, explosive material shall be reported and handled in accordance with the installation’s emergency response plans.
• To ensure that explosives not accidentally go off, should power induced perforation equipment for use in drilling and wells activities be protected from exposure to radio waves and other electrical fields

Approval
All work with explosives requires
• an approved work permit level 1
• an approved work procedure or Safe Job Analysis (SJA)

Safety precautions for work with radioactive sources
• The work site and necessary adjacent areas must be sealed offmarked with approved signs indicating radiation danger
• Information that work with explosives is taking place shall be given over the PA system
• The performing technician must be familiar with procedures, risks and safety measures relevant for the work
• When using explosives in wells, the perforation and safety procedures shall be described in the relevant well programme

Required qualifications
• Responsible contractor shall have internally documented training covering the Activity Regulation’s requirements. Prior to entering into a contract, the contractor’s internal system covering this topic shall undergo a verification activity. The contractor shall upon request be able to show records for personnel subject to this type of training
• The drilling supervisor/SIMOPS leader/HSE Site Lead must have documented knowledge of:
  o classification of explosives
  o current procedures and regulations
  o any elements of risk associated with storing and handling explosives

A one day course covering these topics is available in the industry

Permanent storing of explosives
• Permanent storing of explosives must be avoided
Temporary storage of explosives
• The amount of explosives stored shall be limited to the amount necessary in order to carry out any planned work operations
• Explosives to be stored temporarily onboard (such as baskets with perforating guns) shall be stored in a place which meets the following requirements:
  o the storage place (tank, container or rack) shall be designed for that purpose
  o lifting above the storage place is not permitted
  o in the event of fire in the area, it must be possible to easily move the storage place or move it above open sea
• In case of temporary storage of explosives, the following must be ensured at the storage place:
  o flammable material must be kept more than 2 m away
  o hot work class A - not permitted closer than 15 m away
  o protected against falling objects
  o clearly marked “Explosive goods”; marking must be visible from the crane(s) if the container is placed in the lifting area

Transport
• The responsible contractor and supply base must inform the HSE Site Lead/Company rep. on contracted installations always notify about the shipment before explosives are sent to the installation
• Storeman/inspector on the installation shall inform the HSE Site Lead when:
  o explosives are expected to be received
  o explosives are received
  o explosives are sent onshore
• The recipient of the explosives must ensure sufficient storage capacity before explosives are sent
• All shipment of explosives must be accompanied by the necessary transport documents
• On receipt, the supply base must check that the transport boxes carrying the explosives are in order and marked in accordance with the regulations
• The supply base must inform the vessel and Coast Directorate of any shipment of explosives

5 RADIOACTIVE SCALE

General requirements
• When radioactive scale is proven the dose rate of possible radioactive radiation shall be checked before the work is allowed to continue
• All measurement of uncompacted waste and lead must be carried out in accordance with Measurement of radioactivity scale
• External measurement of scale in tubing must be carried out in accordance with Measurement of g - (gamma) radiation
Approval
All work on systems with radioactive scale requires:
• an approved work permit level 1
• an approved work procedure or Safe Job Analysis (SJA)

Classification of area
The following criteria shall be used to classify an area as controlled area (radioactivity):
• areas where the measured dose rate is above 7.5 μSv/h
• areas with work that can contain possible exposure to radioactive scale
• areas where radioactive scale or contaminated components are stored

Safety measures for work with radioactive scale
• Performing technicians shall be familiar with procedures, risks and safety precautions for the work
• The work must be coordinated with CCR and/or the area technician
• Radioactive scale must be kept moist to avoid creation of dust
• Any openings on radioactive contaminated equipment shall be sealed. The seal shall be verified frequently if the equipment is temporarily stored until shipped
• When finished with the work, the performing technicians must take care and wash themselves thoroughly before eating or drinking
• The work site and necessary adjacent areas must be sealed off/marked with approved signs indicating radiation danger
• Information that the area has been blocked off as controlled area shall be given over the PA system
• The performing technicians shall be equipped with:
  o a disposable dust mask cl P3
  o a disposable coverall
  o chemical gloves
  o chemical glasses
  o boots
• No other work is permitted in controlled areas

Completion of work
• When a job involving radioactive material has been completed, all scaling and equipment where the measured dose rate exceeds the normal background value shall be packed safely and placed in a container to be stored at an approved place
• The supervisor must inform the store supervisor (material coordinator) and HSE Site Lead of the volume and status of the radioactive scale to be transported ashore
• The personnel must be checked for radioactive radiation.
• The controlled area and equipment must be cleaned and checked for radioactive radiation. The area and equipment can be released when the dose rate does not exceed the normal background value
• After use
  o used boots, raingear, gloves, coveralls and other clothing where the measured dose rate does not exceed the normal background value can be used again
  o used coveralls where the measured dose rate exceeds the normal background value must be treated as radioactive waste
  o used raingear and boots where the measured dose rate exceeds the normal background value and which should be used again must be flushed with water until the measured dose rate no longer exceeds the normal background value

Classification of waste offshore
• All radioactive scale and equipment where the measured radiation exceeds 10 bq/g for the sum of the substances $^{226}$Ra, $^{228}$Ra or $^{210}$Pb shall be classified and declared as waste number 3025-1 if it is a sediment or 3091-1 if the waste are from a descaling operation.
• Radioactive waste where the activity for the sum of $^{226}$Ra, $^{228}$Ra or $^{210}$Pb are between 1-10 bq/g, it shall be classified and declared as waste number 3025-2 if it is sediments or 3091-2 if the waste are from a descaling operation. The measurements shall be written on the declaration sheet. The classification of waste shall be done by the radiation responsible person in consultation with the HSE department.
• All radioactive waste and equipment must be sent ashore to a firm which is approved for cleaning and storing radioactive equipment and waste, together with a copy of the measurement results.
• Send measurement report with the equipment that are sent to shore even though the results shows 0 Bq/g so the receiver knows it has been measured.
• Any reinjection of radioactive waste requires reporting as “discharge to soil” in the annual reporting to Norwegian Radiation Protection Agency.

Waste not classified as radioactive waste
• Any waste not classified as radioactive waste (below 1 bq/g) is to be treated as hazardous waste

Intermediate storage of radioactive waste on the installation
• All waste classified as radioactive waste shall be sealed with plastic and stored intermediate in an appropriate container/loading equipment marked with a standard sign indicating ionising radiation
• The area around the container must be sealed off at a distance of minimum one metre from the container. The dose rate at the barring must not exceed 7.5 $\mu$Sv/h, or 0.5 $\mu$Sv/h if the area is a permanent work site
Equipment containing radioactive scale to reparation or service

- When sending pumps/equipment containing radioactive scale for reparation or service, the person responsible for the equipment shall contact the environmental advisor to make sure that the company that receives the equipment has a licence to handle radioactive material or have an agreement with a company with licence from the Norwegian Radiation Protection Agency.

Transport of radioactive waste to shore

- When transported to shore, radioactive waste must be isolated to the extent possible. This includes:
  - wrapping the equipment in plastic
  - protective caps mounted on valve and tubing ends
  - using primarily a closed container or secondarily if the equipment is too big, a loading equipment. If a closed container can’t be used, it is important that the equipment is properly sealed.

Declaration and transport documentation

Declaration form

- All radioactive waste shall be electronically declared as following:
  - Sum activity (226Ra + 228Ra + 210Pb) between 1 and 10 Bq/g from sediments 3025-2
  - Sum activity (226Ra + 228Ra + 210Pb) between 1 and 10 Bq/g, from descaling: 3091-2
  - Sum activity (226Ra + 228Ra + 210Pb) over 10 Bq/g, sediments: 3025-1
  - Sum activity (226Ra + 228Ra + 210Pb) over 10 Bq/g, descaling: 3091-1

- Remember to fill in the measurement result in “information field” on the declaration sheet.

- A printout of the declaration sheet and dangerous goods sheet according to IMDG shall be attached.

Supply base

- There shall be performed control measurements of all radioactive material that arrives the base for exact decision of specific activity (gammaspectorscopi), oilcontent and mercury.
6 RE-INJECTION OF CUTTINGS AND PRODUCTION FRACTIONS

General requirements
All cuttings and production fractions to be reinjected require a permit issued by the Norwegian Environment Agency/Norwegian Radiation Protection Authority for the installation concerned. Chemicals which are part of drilling fluids and production fluids for cementing and slurrification shall be covered by the fields frame permit for discharge. Re-injection of produced water and/or seawater for pressure support are also covered by the frame permit.

Transport between installations
- Cuttings and other production fractions can be reinjected on other installations than the one they were extracted from provided the installation where the reinjection is to take place has a permit for reinjecting fractions from other fields
- It is not permitted to send offshore and reinject cuttings and production fractions which have already been sent ashore, except in cases where the fractions have stayed onboard the vessel carrying the fractions all the time

Fractions that can be reinjected
The following fractions can be reinjected:
- Cuttings w/used drilling fluid
- Drained water from the drilling module
- Surplus cement, chemicals and mixing water from cementing operations
- Seawater
- Production fractions such as
  - drained water from production modules
  - oily chalk, sand, proppant or other tailings from separators, etc
  applies to Valhall
  - produced water in the event of problems with the water treatment plant and backflow of completion and stimulation fluids

Re-injection of other fractions needs to be clarified with the HSE department

Documentation and traceability
A log shall be kept of all substances that are reinjected. The log must, as a minimum, contain:
- type of fraction, in accordance with the above list
- amount
- when reinjecting low specific activity material, the radioactivity measured in Bq/grammes must also be logged
7 HAZARDOUS WASTE

Collection of waste
• On each installation, permanent collecting stations must be set up for each type of hazardous waste
• Everyone carrying out waste-generating work shall collect and store the waste in special areas set up for collection of different types of waste
• Everyone handling hazardous waste shall wear personal protective equipment as recommended in the safety datasheet for the type of waste concerned

Storage
• Waste must be stored in such a way that it does not represent any harm to people, the environment or equipment
• Different types of hazardous waste must not be mixed with other waste/other types of waste so as to cause any risk of pollution or problems in terms of further handling
• The storing of waste must be in accordance with the IMDG code and use appropriate UN-approved drums suitable for fluids and solid waste

Classification
• All waste classified as hazardous waste according to the Table for completing the declaration form must be handled as hazardous waste. If in doubt about the classification, the HSE department must be contacted
• Packaging with residues of products classified as hazardous waste, or which contains toxic, strongly corrosive or health-hazardous products must be handled as hazardous waste
• Cuttings and waste from well streams must be handled in accordance with Re-injection of cuttings and production fractions

Transportation of liquid bulk (slop)
• Liquid bulk (slop) shall be sampled and analyzed under the parameters given in GOMO guidelines (before NWEA). Results for pH, flashpoint measurements and gas measurements must always be stated both on the declaration form and GOMO analysis form
• Documentation of the analysis shall be transmitted to the boat before loading
• At the risk of development of H2S, the liquid bulk shall undergo treatment with Scavenger or Lime where appropriate, before transport to the tanks can start
• With flash point <60°C, (examples of where this can occur is by blending crude oil, condensate or other liquids) liquid bulk shall not be transported in mud tanks. Slop shall then be transported in tanks that are approved for such transport (LFL tanks)
Packaging
• Hazardous waste for transport must be packed in a way that makes it fit for safe storage and transport
• Hazardous waste which is classified as hazardous goods must be handled in accordance with IMDG and ADR Code and use appropriate UN-approved drums suitable for fluids and solid waste

Declaration
• When transporting hazardous waste to a receiving station for hazardous waste, the store supervisor must declare the waste electronically in “avfallsdeklarering.no”. User guide for electronically declaration can be found on the same web site.
• From 1 May 2016 electronic declarations became mandatory and information on how to declare electronically are available at “avfallsdeklarering.no”. If the person that shall declare don’t have access to declare in the database, contact environmental advisor so a userrole can be created. The same duties as before applies but the paper declaration sheet has been replaced by an electronic declaration system. All deliveries of hazardous waste from the installation shall still be accompanied by a print out of the declaration form.
• The declaration form must refer to the transport document, manifest, container number and also specify the shipment date
• A separate declaration form must be filled in for each type of waste – only one waste group to be declared on one form. Use “information” field for measured results (ex H2S measurements)
• A print of the declaration form must accompany the shipment when it leaves the installation until it reaches the receiving station for hazardous waste
• The store supervisor must file a copy of the declaration form onboard the installation

Marking
• When transporting hazardous waste, the waste must be clearly marked with the declaration form number so that the waste can be easily identified
• Hazardous waste which is classified as hazardous goods must be packed in accordance with the IMDG and ADR codes

Transport documentation
The transport documentation for transport of hazardous waste must:
• describe the type of hazardous waste concerned
• contain the declaration form number
• be accompanied by any safetydatasheet
• fill in the analyse results on the GOMO form of liquid bulk transport. Tests and analyzes of liquid bulk (slop) shall be
made in accordance with the guidance given in GOMO guidance

- adhere to NOROG’s guidelines encompassing transport of hazardous materials (i.e. when they are issued. Cf. MARPOOL, Annex II pr. 1.1.2007)
- when transporting hazardous waste which is classified as hazardous goods shall be followed by transport document, sent together with the manifest and information given to the captain of the supply vessel

Supply base
- When receiving hazardous waste, the supply base must
  o log the shipment
  o check that a declaration form has been filled in for the waste and file a copy of this
  o check that the package is intact
  o check that the intermediate storing of the waste is such that it does not represent any danger to people, the environment and equipment
  o forward the waste to the hazardous waste contractor together with the declaration form
- Hazardous waste is not to be re-declared at the supply base. If the declaration form is missing or the packaging has been damaged, a non-compliance report must be registered in IRIS

Hazardous waste contractor
- Hazardous waste is to be sent to a hazardous waste contractor which has a licence from the Norwegian Environment Agency for receiving and treating the waste type concerned
  - The hazardous waste contractor must sign that received waste has been controlled in “avfallsdeklarering.no”
  - The hazardous waste contractor shall use the different steps of control given in the database for declaration.

Environmental accounts and reporting
- The hazardous waste contractor must keep their own environmental accounts for each installation stating the amount and types of hazardous waste generated and how the waste has been disposed of. The environmental accounts must be reported to the HSE department on a monthly basis and be reported in NEMS accounter
- Each year the amount and type of hazardous waste generated in Aker BP activities must be reported to the Norwegian Environment Agency in connection with the annual reporting
8 WASTE SORTING

Collection of waste
- Designated areas for collation of waste shall be designated on each installation.
- Every one generating waste during work shall collate and dispose subject waste at the designated places, such as:
  - Paper
  - Wood
  - Glass
  - Plastics
  - EE-waste
  - Food contaminated combustible
  - Residual waste
  - Metal
  - Grit (*)

*) Grit shall be sorted separately or as hazardous waste containing e.g. PCB. Please consult environmental advisor for support on limit values. Expedient detailed sorting must be assessed by each installation. Please consult the installation’s specific waste disposal stations.

Storage
- Different fractions of waste shall not be mixed. In particular, food contaminated waste, EE and hazardous substances

Packaging
- The waste shall be packed to ensure safe storage and transportation

Labelling
- The container containing waste shall be clearly labelled with type of waste and its origin

Cargo Manifest
- Prior to shipment, the cargo manifest shall as a minimum contain the following:
  - place of origin
  - container number
  - type of waste therein

Supply Base
- Upon receipt of waste, the supply base shall:
  - log the shipment
  - control the cargo manifest and validity of information therein
  - control that the container/shipment is not damaged
  - forward the waste to its final destination point for proper handling
• Identified shortcomings related to the cargo manifest and/or the container shall be registered into IRIS

**Environmental Accounting and Reporting**
• Contractor for waste handling/disposal shall prepare their account split into: installation, amount of waste, type of waste and methodology for disposal. Subject data/report shall be sent to Environmental Advisor on a monthly basis and be reported in NEMS Accounter
• The monthly inputs shall be aggregated into a yearly report sent to the Norwegian Environment Agency
Attachment 1:  
Registration form for work with radioactive scale

Attachment 2:  
Registration form - radiation exposure

Attachment 3:  
Measurement of radioactive scale

Attachment 4:  
Measuring Gamma (γ) Radiation

Attachment 5:  
Table for declaration form for hazardous and radioactive waste

Attachment 6:  
Checklist For Permanently Installed Control Sources
**ATTACHMENT 1: REGISTRATION FORM FOR WORK RADIOACTIVE SCALE**

<table>
<thead>
<tr>
<th>DATE-TIME</th>
<th>MEASURE POINT</th>
<th>Bq/g</th>
<th>µSv/h</th>
<th>COMMENTS</th>
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Measuring instrument:
Sketch with measuring instruments, description of activity

### MEASURES

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<td>Sealed off/marked</td>
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<td>Information to personnel</td>
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<td>Dust mask cl. P3</td>
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<td>Fresh air mask</td>
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<td>Waste marking</td>
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<td>Check of personal contamination</td>
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OSO
Date   Sign

### WASTE

**SAMPLES FOR ANALYSIS (IFE)**

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<th>Characteristics</th>
<th>From container no.</th>
<th>Total radioactivity (IFE)</th>
<th>Container no/weight</th>
<th>µSv/h at 1m</th>
<th>Calculated Bq/g</th>
<th>Waste class</th>
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**CONTAINERS**

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<th>Characteristics</th>
<th>From container no.</th>
<th>Total radioactivity (IFE)</th>
<th>Container no/weight</th>
<th>µSv/h at 1m</th>
<th>Calculated Bq/g</th>
<th>Waste class</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Description of waste. Overall evaluation. Further treatment/transport, etc.

(Waste classes: radioactive waste/normal waste/hazardous waste (oily))
## ATTACHMENT 2: REGISTRATION FORM – RADIATION EXPOSURE

<table>
<thead>
<tr>
<th>Company</th>
<th>Name of person</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation</th>
<th>Date</th>
<th>Duration (hours and minutes)</th>
<th>Dose rate µSv/h</th>
<th>Exposure µSv</th>
</tr>
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<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>Dosimeter check</th>
<th>Dosimeter no:</th>
<th>Handed out, date:</th>
<th>Handed in, date:</th>
<th>Total exposure:</th>
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<th>Handed in, date:</th>
<th>Total exposure:</th>
</tr>
</thead>
</table>
ATTACHMENT 3: MEASUREMENT OF RADIOACTIVE SCALE

Application area
- Measurement of radioactivity is used for the measurement of:
  - components with radioactive scale
  - loose materials
  - lead deposits
- The measurements can be carried out directly on the component or on a sample taken from the component

Calibration of instruments
1. Use the standards where the ratio between the nuclides $^{226}\text{Ra}$ and $^{228}\text{Ra}$ is 3:1. These containers are labelled with yellow labels on the lids.
2. Measure the background counting rate on site over a period of a few seconds. If the background is significant (> 5 CPS), then the measured counting rate must be adjusted accordingly.
3. The lid is screwed off the container before calibration. Specific activity of $^{226}\text{Ra} +$ specific activity of $^{228}\text{Ra}$ in units of Bq/g are indicated on the label on the bottom of the container. Note this.
4. Place the probe in direct contact with the surface of the deposit and start measuring. It is recommended to measure the average counting rate over a period of few seconds.
5. Repeat this procedure for the two other standards in this series.

The result can be illustrated graphically by displaying the specific activity in Bq/g as a function of the counting rate in CPS, as illustrated in the example below. A straight line is drawn in the best possible way through the three measurement points. A horizontal line is then drawn in on the graph denoting the LLW limit for classification as free, which will correspond to 1 Bq/g, since we measure the specific activity of the sum of the two radium isotopes and the ratio between them is 3:1. All results over 10 Bq/g are deposit duty and between 1-10 Bq/g shall be declared on a declaration sheet and be shipped ashore. Remember to fill in the measurements results in the information field on the declaration form.
Measurement directly on the component
1. Before taking a measurement. Turn the instrument on first and check the battery voltage.
2. Then check the counting rate against a known radiation source. One of the standards in the LLW standard set is suitable for this purpose.
3. To prevent the measuring probe from getting dirty, it is advisable to cover it with thin cling film. If cling film are used, you shall also use cling film when calibrating.
4. Measure the background counting rate on site. If it is low (< 5 CPS) you can ignore it.
5. The measurement is performed by holding the measuring probe in close proximity to the internal surface of the component. Measurements should be taken at a number of different points on the component. The measurement points should be chosen based on where it is most likely deposits will be found.
6. The measurement result in CPS shall be entered in the measurement report.
7. Specific activity in Bq/g can be determined based on the instrument’s calibration curve. The value shall be entered in the measurement report.

Measurement of deposit or loose material samples
1. Extract a suitable amount of material (100-200g) from the component and place it in a container similar to the calibration containers.
2. Take the container to a site where there is no explosion risk and there are no other radiation sources nearby.
3. A functional check of the instrument shall be performed before taking a measurement. Turn the instrument on first and check the battery voltage.
4. Then check the counting rate against a known radiation source. One or the standards in the LLW standard set is suitable for this purpose.

5. To prevent the measuring probe from getting dirty, it is advisable to cover it with thin cling film.

6. Measure the background counting rate on site. If it is low (< 5 CPS you can ignore it.

7. The measurement is performed by holding the measuring probe in close proximity to the sample. Find the average reading. The measurement result in CPS shall be entered in the measurement report.

8. Specific activity in Bq/g can be determined based on the instrument’s calibration curve. The value shall be entered in the measurement report.
ATTACHMENT 4:
MEASUREMENT OF $\gamma$-(GAMMA) RADIATION

Area of application
- The metering of $\gamma$-radiation on the exterior of pipes or components is used when measurement directly on coating or scale (see Appendix 5) is not possible, or when, for some reason, the presence of radioactive scale/sediment is to be determined. One possible area of application could be metering on the exterior of the separator tank for determination of radioactive sediment
- The metering is to be conducted with $\gamma$-sensitive instruments, for example a dose meter. The unit displayed by the instrument is not important: the concluding result will be obtained

Method limitations
- The method is qualitative, meaning that it only determines if radioactive material is present or not
- The method has a high determination limit, meaning that it will give a positive result only when large quantities of radioactive material are present
- The method can not be used to demonstrate potential deposits of radioactive lead ($^{210}$Pb)
- The method is sensitive to other possible nearby deposits of radioactive sources

Metering procedures
1. Clean the instrument before metering, to ensure that the instrument is not contaminated from earlier measurements.
2. Test battery function.
3. Survey the background spectrum by metering the area surrounding of the point to be metered. This is done to find possible other deposits of radioactive sources that could affect the measurement.
4. Measure the background spectrum about 1 meter from where the metering is to take place towards the area where the background spectrum (see point 3) is the strongest. Record the result as Background.
5. With the instrument in contact with the surface of the pipe or component, commence metering. Record the result as Measurement.
6. If Measurement is considered to be definitely larger than Background, the presence of radioactive scale/sediment is proven. (Comment: it is practically impossible to define more specific criteria than the above. The correct use of the method depends on the users experience and good judgment.)
## ATTACHMENT 5: TABLE FOR DECLARATION FORM FOR HAZARDOUS AND RADIOACTIVE WASTE

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Description of Waste</th>
<th>Quantity</th>
<th>Unit</th>
<th>Other Relevant Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>Hazardous Material A</td>
<td>100 kg</td>
<td>Kg</td>
<td>Leaking caused by unknown origin</td>
</tr>
<tr>
<td>Category 2</td>
<td>Radioactive Substance B</td>
<td>50 mCi</td>
<td>Ci</td>
<td>Radioactive contamination from reactor</td>
</tr>
<tr>
<td>Category 3</td>
<td>Organic Waste C</td>
<td>200 L</td>
<td>L</td>
<td>Biodegradable and compostable</td>
</tr>
<tr>
<td>Category 4</td>
<td>Metal Scrap D</td>
<td>100 kg</td>
<td>Kg</td>
<td>Non-ferrous and scrap metal</td>
</tr>
<tr>
<td>Category 5</td>
<td>Electronic Waste E</td>
<td>50 kg</td>
<td>Kg</td>
<td>E-waste and hazardous components</td>
</tr>
<tr>
<td>Category 6</td>
<td>Medical Waste F</td>
<td>100 L</td>
<td>L</td>
<td>BIOHazardous and lab generated waste</td>
</tr>
</tbody>
</table>

### Notes
- Categories are based on International Hazard Classification Standards.
- Quantities are subject to periodic audit and verification.
- Additional documentation required for Category 5 and 6 wastes.
- Contact local environmental authority for further guidance.
# ATTACHMENT 6: CHECKLIST FOR PERMANENTLY INSTALLED CONTROL SOURCES

## Checklist for Permanently Installed Control Sources

<table>
<thead>
<tr>
<th></th>
<th>Verified</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Source Tag No:…………………………………… Padlock no:……………</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Source strength:……………… Date:…………….. Type:……………….</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The conditions for sources and source containers stipulated in Industrial Control Sources in Fixed Installations (Norwegian Radiation Protection Agency) have been fulfilled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Instructions and procedures for control and maintenance have been established</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Company and contact person……………………….………tel:……………..… for the repair and maintenance of the control source have been identified</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 7 | The control source has been installed so that it is impossible to expose parts of the body to radiation levels that exceed:  
500 µSv/t measured 5 cm from the surface of the container  
Measured radiation level 5 cm from the container:…………………… | | |
| 8 | The detector is shielded so that the radiation level does not exceed 7.5 µSv/t at a distance of 1 m.  
Measured radiation level 1 m from the detector:……. | | |
| 9 | The installation with a radioactive source has been clearly labelled (Norwegian text) with a standard warning sign for ionised radiation. | | |
| 10 | The installation has been clearly marked (Norwegian text) with an “open” and “closed” position | | |
| 11 | A risk analysis has been performed | | |
| 12 | Risk-reducing measures have been identified and implemented | | |
| 13 | Special emergency response conditions have been identified and implemented | | |

Date:______________ Operator ________________________  
Radiation Responsible person:__________________________

*Archived by the radiation responsible person on the installation where the fixed control source is located*