



IGas Energy PLC

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NORM Assessment and Processing Procedure



TABLE OF CONTENTS

Scope.....	3
Introduction	3
Definitions	3
Requirements	4
4.1 Personnel Responsible for Radiation Protection	4
4.2 Methodology	4
4.3 NORM Characterisation	5
4.4 Assessment, Accumulation and Disposal.....	6
4.5 NORM Contaminated Items Chemical Composition.....	7
4.6 Permit Compliance	7
FIGURE 1: NORM ASSESSMENT PROTOCOL FLOWCHART	9

Notice

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Document History

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05	Change EPR reference to EPR 16	RR	CB	SR	31.01.17
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07	Amendments to assessment methodology and training descriptions required following an Environment Agency audit recommendations	RR	RPA CB	SR	30.05.2019

**Key parties are specified for ease of reference. But the formal review and approval process is logged within the M-Files systems.*



Scope

This document applies to all activities involving the assessment and processing of equipment contaminated with Naturally Occurring Radioactive Material (NORM) at IGas Energy plc and any of its subsidiary company (IGas) sites.

Introduction

IGas produces Naturally Occurring Radioactive Materials (NORM) as a by-product of the extraction of gas and oil. NORM is universally present within the Earth in varying concentrations and appears as radioactive mineral scale in tubulars and well head equipment due to changes in environmental conditions during the extraction process.

Any equipment found to contain radioactive scale is to be securely stored awaiting assessment and where necessary, identification of a suitable route for disposal. NORM contaminated material may also be present in “sludge” removed from the bottom of the well bore. Due to the geology of that specific site this sludge can have elevated levels of NORM. When detected, this sludge is to be removed (subject to a risk assessment), placed into storage drums and stored as NORM waste awaiting identification of a suitable route for disposal.

Definitions

IRR17	Ionising Radiations Regulations 2017
EPR16	Environmental Permitting (England and Wales) Regulations 2016
CDG11	Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (including Amendment 2011)
NORM	Naturally Occurring Radioactive Material
HSEx	Health and Safety Executive
RPA	Radiation Protection Adviser (Aurora)
RWA	Radioactive Waste Adviser (Aurora)
RPS	Radiation Protection Supervisor (IGas)
RMS	Radiation Management System
DGSA	Dangerous Goods Safety Adviser
ADR	Current Agreement on Carriage of Dangerous by Road Goods

Requirements

4.1 Personnel Responsible for Radiation Protection

- i. The Radiation Employer (IGas) is legally responsible for achieving compliance with the Ionising Radiations Regulations 2017 (IRR17).
- ii. The RPA/RWA (Aurora) advises on the requirements of current legislation IRR17, the Environmental Permitting (England and Wales) Regulations 2016 (EPR16) Regulations and Transport, and the measures to be taken to ensure that a high standard of radiological protection is achieved through good working practice. IGas employ their own in-house DGSA
- iii. The IGas RPS will request the sample analysis laboratory to provide sample containers, and assign a batch number (sample URNs i.e. unique reference numbers) for samples of NORM that require analysis.
- iv. The Radiation Protection Supervisor (IGas) duties include:
 - Supervision in the compliance with the requirements of this procedure.
 - Monitoring/supervising compliance with the Local Rules for working with NORM (HSE-PR-005).
 - The ability to exercise the authority to suspend work with NORM.
 - Carrying out radiation dose rate and contamination monitoring.
 - Sampling
 - Maintaining current records.
 - Ensure that all arrangements put in place by the Radiation Employer are adhered to by IGas employees and contractors working with NORM.
 - Achieving compliance with permit conditions and limitations.

4.2 Methodology

All radiation monitoring for IGas will be undertaken by a suitably trained individual using the current NORM Assessment protocol flowchart included in this procedure (see page 6).

Where there is a requirement to remove plant and equipment from a well head or well bore or to breach containment in process plant then a suitably trained individual must be present with 'in test' radiation monitoring instrumentation. The individual will monitor exposed surfaces of plant/equipment to check for the presence of NORM as the equipment is extracted or recovered from the well head or process containment is breached. A reading of twice the instruments normal background response should be taken as indicating the potential presence of NORM.

The methodology for this can be found in:

[HSEQ.PC.001 - NORM - Twice background Methodology - 00 - 25/06/2019 \(Desktop, Web, Mobile\)](#)

-For routine tasks that require breaking of containment at a site with no history of NORM, then a recorded check for the presence of NORM shall be carried out at monthly intervals. If the presence of NORM is known, then checks should be carried out at every break of containment.

The RPS will undertake monitoring to determine if equipment or items are NORM contaminated. Where an oil well is known to produce NORM and requires sludge removal from the well bore, the process shall only be undertaken with the direct supervision of a suitably trained person. Samples should be taken from all material either known (positive hand held monitoring indication) to be NORM contaminated or if it is suspected of being NORM contaminated. When monitoring by the RPS identifies NORM contaminated or suspected NORM contaminated items, they will collect one or more representative samples of the material. Where the material produces a radiation signal exceeding twice background, then the sample should be taken from the most accessible point where the radiation signal is the highest.

The minimum sample size should be approximately 100-200g and should be collected in a standard gamma spectrometry pot. The sample containers will be requested by IGas from an appropriate

supplier, and will be provided to the RPS who will undertake the sampling. Each sample container will be allocated a unique reference number (URN) upon issue, to allow tracking of the sample through the analysis process. The item will then be fitted with a durable tag with the relevant URN, date sampled and site/well location. Several items from the same batch can be banded together (e.g. Pump rods/tubulars) provided that the banding will remain intact until disposal/repair is completed. The RPS will collect, monitor and package the sample to ensure that the items falls within the transport definition of an Excepted package and return it the appropriate RPS who is responsible for arranging shipment to an analysis laboratory following the guidance of the DGSA. IGas will contact the RPA prior to samples being dispatched who will provide the appropriate documentation to IGas and will contact the analysis laboratory informing them to expect samples for analysis. It is important that IGas do not ship samples until the receiving laboratory has acknowledged that they are willing to accept the samples. IGas will package the samples in accordance with ADR legislation and arrange shipment.

4.3 NORM Characterisation

Initial determination of whether NORM is present will be by direct monitoring using tested hand held radiation monitoring equipment. For all materials suspected of being NORM contaminated, samples must be taken and sent for laboratory analysis. This includes material confirmed by hand held monitoring via a signal and those which are suspected of being NORM contaminated but do not produce a signal. Contact the RPA/RWA (Aurora) for advice on laboratory sample analysis.

4.4 Assessment, Accumulation and Disposal

NORM contaminated sludge will be classified as NORM waste when it is detected at its point of origin. The NORM contaminated sludge will be placed into IP2 drums which will be sealed. If no permit to accumulate and store NORM waste is in place, an application will be made to the Environment Agency for that field.

Representative samples of the sludge will be taken from the drums for analysis following the process, Methodology 4.2.

If there is no permanent NORM storage at the point of origin site, a temporary controlled area will be created using on site bund's if available, or portable drum bunding with a capacity of 110% of the drum contents, with barriers and warning signage. Transport to a nominated accumulation centre shall be arranged by the RPS/DGSA as soon as reasonably practicable.

When NORM contaminated material is identified it will be transported as soon as is reasonably practicable on to one of IGas's nominated assessment centres, Welton Gathering Centre, Cold Hanworth or Beckingham 1, under ADR regulations. ~~The Maintenance Superintendent or Well Service Supervisor~~ The Department RPS will assess the NORM contaminated material in a timely manner as to its future use within the group. If it is determined that there is no future use for the NORM contaminated material it will be re-classified as NORM waste. This information will be recorded on the NORM Contaminated Items Register and passed on to the area Operations Manager, who will authorise this determination. IGas has or will apply for appropriate permits as and when required for the accumulation, storage and disposal of NORM waste.

This assessment of potential contaminated material will take into account:

- the quantity of equipment potentially NORM contaminated,
- the condition of the equipment,
- functionality and likely future life span,
- operational requirements and availability of replacement equipment,
- the actual level of NORM contamination if shown to be present, and
- handling and exposure risks to operatives.

The above list is not exhaustive as other factors need to be considered when determining the future use of any identified NORM contaminated equipment.

Where NORM contaminated equipment is to be stored (whether for re-use or sentenced as NORM waste) then the items must be protected to minimise the loss of NORM from the item. This will usually involve wrapping and sealing the object in polythene, end-capping tubulars, valves etc. NORM contaminated materials and NORM waste will be stored separately from other materials and wastes.

The NORM contaminated items must then be placed in secure bunded storage with a tarpaulin or similar to provide weather protection, and signage to indicate NORM storage and any prohibitions as appropriate e.g. Controlled Area etc. Controlled areas will be signed and monitored as identified in the local rules for the storage area. NORM items identified for disposal must be disposed of in accordance with permit conditions via a permitted waste recipient.

4.5 NORM Contaminated Items Chemical Composition

All items identified as being NORM contaminated will also be subject to Waste Acceptance Criteria (WAC) tests and tests for mercury if required by the final waste recipient's Conditions for Acceptance

(CFA's) to establish the chemical composition of the wastes. This applies to NORM materials including those arising from any descaling or Flat Tank clearing work. WAC analysis may be required to ensure that disposal of NORM wastes can be achieved.

4.6 Permit Compliance

The Environmental Permit is an official legal document that allows IGas to accumulate and dispose of radioactive waste from specified sites under the following conditions set out below:

- Management
- Operations
- Disposal of Radioactive and Monitoring
- Information

Under the Environmental Permit, NORM contaminated materials once designated as a waste are allowed to be accumulated for a period as stated within the permit, during this period, a suitable disposal route must be sourced. The maximum annual quantity of NORM contaminated material which can be disposed of from any permitted premises is stated on the sites specific Permit. There are several disposal routes for the disposal of NORM contaminated materials which include:

- Landfill
- Incineration
- Transfer to a waste permitted person

Materials with a solid NORM concentration of less than 0.5 Bq/g for Radium-226 and its daughters are not radioactive (Out of Scope) for the purposes of the waste legislation. Solid materials with a NORM concentration that exceeds the Out of Scope Values but is less than 5Bq/g (sum of the highest radionuclides within the U-238 and Th-232 decay chain) are considered to be Exempt from Permitting but the operator must still maintain records of its storage and disposal. Solid NORM waste material above the 5 Bq/g limit are considered to be low level radioactive waste and must be managed within the conditions identified in the sites respective Permit. If a site does not have a Permit then an exemption limit of 5 Bq/g applies but the conditions in the NORM Exemption Order must be complied with. If NORM waste is encountered on a Non-Permitted site (EPR16) then the RPA/RWA should be contacted for additional advice as soon as practicable.

Activity Concentration (Bq/g)	Status	Disposal Route
< 0.5	Not radioactive	Treat as non-radioactive waste - route determined by other hazardous properties of waste



>0.5 < 5.0	Exempt but radioactive	Dry Scale to Landfill (Dependant on chemical composition) Else incineration dependent on oil content, heavy metals etc
> 5.0	LLW Radioactive	Dry Scale to Landfill (Dependant on chemical composition) Else incineration dependent on oil content, heavy metals etc

FIGURE 1: NORM ASSESSMENT PROTOCOL FLOWCHART

