Reporting of Discharges of Radioactive Substances from the Non-Nuclear Sector to the OSPAR Maritime Area

(OSPAR Agreement 2013-11, 2021 Update)[1]

Introduction

1. This document sets out how OSPAR Contracting Parties should report on discharges of radioactive substances from non-nuclear sub-sectors.

Reporting coverage

2. Contracting Parties should report discharges of radioactive substances from non-nuclear sub-sectors to the OSPAR maritime area as identified in Annex 1.

3. If a sub-sector ceases to be present in a Contracting Party, or if it ceases to make discharges of radioactive substances, such closure or cessation should be reported to OSPAR. If any sub-sector in Annex 1 or any other source of non-nuclear radioactive discharges to the OSPAR maritime area becomes established in the Contracting Party, OSPAR should be informed and reporting for that sub-sector should begin from the following 1st of January.

4. Where new sources of non-nuclear radioactive discharges to the OSPAR maritime area are established, Contracting Parties should report briefly on the nature of discharges, including their origin and their essential physical and chemical properties, as well as details of any methods used to derive the magnitude of the discharge. This information should be sent in a separate word document. It will be sufficient for this to be provided once, unless or until there is a change in the nature of the discharge or the methods used. This does not apply to reporting from the oil and gas or medical sub-sectors, where the agreed procedures already implicitly provide this information.

Reporting of discharges of radioactive substances from the oil and gas sub-sector

5. For the oil and gas sub-sector, Contracting Parties should report separately the discharges of radioactive substances that fall under the following categories:

a. Produced water

b. Descaling operations, both offshore and onshore, from normal production that leads to discharges of:

   i Radioactivity in suspended solids arising from water-jet descaling

   ii Radioactivity in solution as a result of descaling using acids or scale dissolvers

c. Descaling operations, both offshore and onshore, from decommissioning of oil and gas installations that leads to discharges of:

[1] English only

i Radioactivity in suspended solids arising from water-jet descaling

ii Radioactivity in solution as a result of descaling using acids or scale dissolvers

d. Radionuclide tracers.

Guidance on sampling and analysis for the reporting of discharges of radioactive substances from the oil and gas sub-sector

6. For produced water, the same sampling point should be used as for the produced water sampling programme under OSPAR Recommendation 2001/1 for the measurement of dispersed oil and other substances – that is, "after the last item of equipment in or downstream of a turbulent region but prior to any subsequent dilution".

7. Samples of produced water should be taken four times in each year, separated by approximately equal periods of time. The samples should be taken from the discharges from each offshore installation discharging produced water which is subject to the sampling regime required by OSPAR Recommendation 2001/1 (some smaller unmanned gas installations are effectively excluded from the 2001/1 regime). The samples should be analysed using high-resolution gamma spectrometry or alpha spectrometry for the radionuclides Ra-226, Ra-228 and Pb-210. Estimates of total discharges of these radionuclides, as both suspended solids and dissolved activity, should be calculated from the activity concentrations (Bq/l) in the samples and the total amount of produced water discharged in the period. The multiplying factor should relate to the total volume of discharge before dilution (see above).

8. For discharges from descaling operations, three different approaches to descaling need to be considered in order to choose the appropriate way to estimate any discharge of radioactive substances.

a. the use of high-pressure water jets, with the discharge of the water and the scale dislodged by it to the sea (without settlement and separation of the scale);

b. the use of high-pressure water jets, followed by settlement of the water used, in order to allow the scale to settle as sediment, and the subsequent removal of that sediment to land and discharge of the water fraction to the sea;

c. the use of acids and scale dissolvers to remove the scale and the discharge of the whole to the sea.

9. Where the approach in §8(a) or (c) is used, samples should be taken of the liquids as they are discharged during each separate descaling operation. Where a descaling operation lasts several days, the whole may be regarded as a single operation. The sample should be taken while the descaling discharge is fully under way – not at the beginning or the end of the process or close to any pause in it.

10. Where the approach in §8(b) is used, samples should be taken from relevant settlement tanks before discharge of the water fraction. It is assumed that the water fraction contains negligible amounts of radionuclides. To confirm this, samples should be taken from major descaling operations in a three-year period. The data obtained will be reviewed at the end of the period with a view to discontinuing measurements unless they can be justified.

11. In cases under §8(a), the amount of Pb-210, Ra-226, Ra-228 and Th-228 discharged should be estimated on the basis of measurements of the amounts of solids in samples of the discharged water, and the analysis of those solids using high-resolution gamma-spectrometry or alpha spectroscopy. Estimates of total discharges of these radionuclides, should be calculated from the activity concentrations (Bq/l) in the samples and the total amount of water discharged. There is no need to measure radioactive substances in solution in the water, since more than 95% of the radioactivity in a sample is likely to be concentrated in the solids.

12. In cases under §8(b), the amount of Pb-210, Ra-226, Ra-228 and Th-228 in the water fraction should be measured using high-resolution gamma-spectrometry or alpha spectrometry. Estimates of total

discharges of these radionuclides, should be calculated from the activity concentrations (Bq/l) in the samples and the total amount of water discharged.

13. In cases under §8(c), the amounts of radioactive substances in solution must be taken into account, in addition to any solids. Samples of the solution should therefore also be analysed, using high-resolution gamma-spectrometry or alpha spectrometry. Estimates of total discharges, should be calculated from the activity concentrations (Bq/l) in the samples and the total amount of water discharged.

14. It is important to ensure that, when sampling is conducted prior to dilution, the multiplying factor relates to the total volume of discharge before dilution.

15. For the use of radionuclide tracers, Contracting Parties should report the amount of activity that is applied in tracer experiments. Radioactive tracers should be reported against "Tritium" and "Total of other beta and gamma emitters".

Reporting of discharges of radioactive substances from the medical sub-sector

16. The aim of the reporting is to estimate the scale of medical discharges of radioactive substances consistently across the OSPAR maritime area, without imposing unjustified administrative burdens on health services. Reporting should therefore be based on data collected for other purposes. Most hospitals and medical centres should be collecting data on the amount of medicinal radionuclides administered. At RSC 2009 it was agreed that so little Tc-99 was generated from the medical use of Tc-99m that reporting of discharges of Tc-99 could cease.

20. Contracting Parties should report discharges of the radionuclide I-131, but on the basis of whether holding tanks are in use to reduce activity concentrations of I-131 to below 10 Bq/l.

21. Where holding tanks are not in use Contracting Parties should calculate the amount of I-131 discharged on the basis of biokinetic data from ICRP 53 (ICRP, 1988), where the stated proportion of the administered doses that is discharged as liquid waste is as follows:

a. I-131 Ablation Therapy – 100% of the administered dose;
b. I-131 Thyrotoxicosis treatment – for in-patients, 50% of the administered dose; for out-patients, 30% of the administered dose; for patients who cannot be classified as in-patients or out-patients, 50% of the administered dose.

22. Where holding tanks are in use, Contracting Parties can simply inform OSPAR that this is carried out. It is not necessary to confirm this each year unless the situation changes.

Reporting of discharges of radioactive substances from the Universities and Research sub-sector

23. Where universities and research centres use holding tanks to reduce the activity concentrations of P-32, S-35 and Cr-51 in liquid discharges, Contracting Parties can simply inform OSPAR that this is carried out. It is not necessary to confirm this each year unless the situation changes.

Reporting of discharges of radioactive substances from other non-nuclear sub-sectors

24. For the phosphate industry, titanium dioxide, primary steel, and rare earth sub-sectors, discharges of Pb-210, Po-210, Ra-226, Ra-228, U-234 and U-238 should be reported where applicable. For the gaseous tritium light device sub-sector, discharges of H-3 should be reported. For the radiochemical sub-sector, discharges of the indicators listed in the reporting format should be reported where applicable. It is recognised that for some Contracting Parties, discharges from the radiochemical sub-sector are included with those from other nuclear sub-sectors due to co-location of sites.

Reporting guidance and derivation of calculated values of total alpha and total beta (excluding tritium)

25. In reporting discharges from the non-nuclear sector, Contracting Parties should follow the guidance given in the reporting formats as well as the following general instructions:

a. The OSPAR region (i.e. I, II, III, IV or V) to which discharges are made should be stated;
b. Discharges should be reported in TBq;
c. If no data is available, cells in the reporting format should be left blank;
d. Not symbols (<) or any other text should be used to indicate that a reported discharge is based on detection limits, only the numerical value should be included.

26. The reporting format for the oil and gas sub-sector includes formulas and definitions for the derivation of calculated Total alpha and calculated Total beta (excluding Tritium) for discharges of produced water and from descaling activities (where data for Th-228 is reported) as agreed by RSC (RSC 06/3/Info.1).

Reporting procedures

27. Discharges of radioactive substances from the non-nuclear sector should be made using the agreed reporting formats by the 30th of September of each year. The reports should be emailed to data@ospar.org

28. Reporting formats are available from: https://www.ospar.org/work-areas/rsc/other/reporting-formats

29. The data reported will be considered at the RSC annual meeting in the following year.

Review of agreement

30. RSC should review the sub-sectors and the indicator radionuclides as well as any reporting procedures and guidance that are covered in the agreement as required.

References

ICRP (1988). Annals of the ICRP Vol 18/1-4, ICRP Publication 53, Radiation Dose to Patients from Radiopharmaceuticals, Pergamon Press, Oxford, United Kingdom.

Annex 1 Overview of the non-nuclear sub-sectors present within Contracting Parties and where discharges of radioactive substances occur to the OSPAR maritime area.

Contracting Party	Oil and gas		Medical		Universities and Research		Phosphate industry		Titanium dioxide		Primary steel		Rare earth		GLTD		Radiochemical	
	P	**D**	**P**	**D**	**P**	**D**	**P**	**D**	**P**	**D**	**P**	**D**	**P**	**D**	**P**	**D**	**P**	**D**
Belgium	N	-	Y	Y[BE1]	Y	Y[BE2]	N	-	Y	Y[BE3]	Y	N[BE4]	N	-	N	-	N	-
Denmark	Y	Y	Y	Y[DK1]	Y	Y[DK2]	N	-	N	-	N	-	N	-	N	-	N	-
Finland	Y	N[FI1]	Y	Y[FI2]	Y	Y[FI2]	Y	N	Y	N	Y	N	N	-	N	-	N	-
France	Y	N[FR1]	Y	N[FR2]	Y	Y[FR3]	Y	N[FR4]	Y	N[FR5]	Y	N[FR6]	Y	Y	N	-	Y	Y[FR7]
Germany	Y	Y	Y	Y[DE1]	Y	Y[DE1]	Y	Y[DE2]	Y	Y[DE2]	Y	N[DE3]	Y	Y[DE2]	N	-	Y	Y[DE1]
Iceland	N	-	Y	Y	Y	Y[IS1]	N	-	N	-	N	-	N	-	N	-	N	-
Ireland	Y	Y	Y	Y	Y	Y[IE1]	N	-	N	-	N	-	N	-	N	-	N	-
Luxembourg	N	-	Y	Y[LU1]	Y	Y	N	-	N	-	N	-	N	-	N	-	N	-
Netherlands	Y	Y	Y	Y[NL1]	Y	Y[NL2]	N	-	Y	Y	Y	Y[NL3]	N	-	N	-	Y	Y[NL4]
Norway	Y	Y	Y	Y	Y	Y	Y	N[NO1]	Y	Y	Y	N[NO2]	N	-	N	-	N	-
Portugal	N	-	Y	Y[PT1]	Y	Y[PT1]	Y	Y[PT2]	N	-	Y	Y[PT2]	N	-	N	-	Y	Y[PT2]
Spain	Y	Y[ES1]	Y	Y[ES2]	Y	Y	N[ES3]	-	Y	Y[ES4]	Y	N[ES5]	N	-	N	-	N	-
Sweden	N	-	Y	Y	Y	Y	N	-	N	-	N	-	N	-	N	-	N	-
Switzerland	N	-	Y	Y[CH1]	Y	Y[CH2]	N	-	N	-	N	-	N	-	Y	Y	N	-
United Kingdom	Y	Y	Y	Y	Y	Y	N	-	Y	Y	Y	N	N	-	N	-	Y	Y

P – Present: D- Discharge to the OSPAR maritime area

BE1 - Holding tanks are used to reduce the concentration of I-131 in the liquid discharges to below 10 Bq/l.

BE2 - Holding tanks are used to reduce concentration of P-32, S-35 and Cr-51.

BE3 - Pb-210 and Po-210 are not monitored.

BE4 - According to our knowledge, release of Pb-210/Po-210 from the steel industry would rather affect atmospheric discharges.

CH1 - Discharges from holding tanks in hospitals.

CH2 - Swiss authorities require universities and research centres to use holding tanks to reduce concentration of P-32, S-35 and Cr-51 in liquid discharges.

DE1 – Holding tanks are used to reduce discharged activities. Non-nuclear facilities are often exempted from reporting their discharged activities where they are not expected to be dose relevant to the general public.

DE2 – Radionuclide discharges from NORM industries are rarely monitored/reported. So far, only discharged activities from decommissioned uranium mines (WISMUT GmbH) are published in national reports. In a national research project finalised in 2017, NORM discharges from different industries in Germany were scrutinised. Following this study, doses to the general public as a result of liquid discharges from phosphate, TiO_2, and rare earth industries were estimated to be well below 100µSv/yr.

DE3 - Liquid discharges from steel production were not considered as part of the 2017 research project, as aerosol emissions were mentioned to be much more dose relevant.

DK1 - Discharges from holding tanks in hospitals.

DK2 – Generally very small discharges. For potential larger discharges holding tanks are required.

ES1 - There is only one oil and gas industry that discharges to the OSPAR maritime area. According to Spanish legislation this NORM industry is not obliged to report on discharges, so the provided activity values are generic values.

ES2 - Holding tanks are used to reduce the concentration of I-131 in the liquid discharges to below 10 Bq/l.

ES3 - The two Spanish plants that produced phosphate fertilizers were shut down in 2012 and 2019. The plant that shut down in 2019 stopped generating phosphogypsum waste in 2011 due to a change in the production process.

ES4 - There is only one titanium dioxide plant that is located on the South West coast. According to Spanish legislation NORM industries are not obliged to report on radioactive discharges. The provided activity values have been estimated from a study that is being carried out by the Sevilla and Huelva Universities. Therefore, they are generic values.

ES5 - According to the available information, there are no integrated steel plants in Spain. The Spanish steel making plants (conversion of pig iron to steel) operate a dry gas cleaning process and, for this reason, no discharges of Pb-210 and Po-210 take place.

FI1 –There are no oil or gas extraction activities generating radioactive liquid discharges in Finland. There are oil refineries and gas transport pipelines in Finland, but they do not produce liquid discharges to the OSPAR maritime area.

FI2 – The release from hospitals and from research units are considered to be below monitoring limit (10x free limit/month/place of usage) and the actual releases to sewage system and to the Baltic Sea are not monitored. There are no releases directly to the OSPAR Maritime area.

FR1 – There are a few industries in the oil and gas sub-sector (such as oil refineries for instance) but they do not produce radioactive liquid discharges. There are no oil or gas extraction activities generating radioactive liquid discharges.

FR2 - Decay tanks are used systematically to reduce concentrations of short-lived radionuclides used in therapy such as I-131 in any liquid discharges and delay systems are used systematically to reduce concentrations of short-lived radionuclides used for diagnostic purposes such as Tc-99m in any liquid discharges.

FR3 – Discharges from the research activities carried out by CEA are counted in the nuclear sector. Other universities and research activities do not have liquid discharges (the liquid effluents are not discharged but eliminated in waste treatment facilities).

FR4 – Many of the plants producing phosphate fertilizers in the OSPAR area were shutdown. The others have ceased the production of phosphoric acid: the phosphoric acid to be used in the process is imported. So the liquid discharges do not contain radionuclides.

FR5 – There are no liquid discharges of NORM.

FR6 - According to our knowledge, release of Pb-210/Po-210 from the steel industry would rather affect atmospheric discharge. So Pb-210 and Po-210 are not monitored in the liquid discharges.

FR7 – Radiochemical (more precisely radiopharmaceutical) fabrication is reported in nuclear sector (together with CEA Saclay Research Centre discharges)

IE1 - The discharges from the education and research sectors are likely to vary year on year and are highly dependent on the specific research projects that are currently being undertaken by the institutions that use unsealed radionuclides.

IS1 - There can be occasional discharges but some years there are none. Amounts are very small in all cases.

LU1 - There is one national centre for I-131 cancer treatment that uses delay tanks – discharges are monitored and are always below 5 Bq/l. Other hospitals may administer I-131 up to 800 MBq/patient for non-cancer indications only.

NL1 - Delay tanks may be in use, and there is no requirement for detailed reporting.

NL2 - There are discharges but they are not reported to OSPAR because of the very small amounts.

NL3 - There are only incidental discharges from primary steel manufacture, but they are below the level requiring a permit and hence there is no national requirement for reporting.

NL4 - For the Netherlands, discharges from the Radiochemical sub-sector are reported under the Nuclear Research and Development sub-sector, since the production facility in the Netherlands is located on the same site as the HFR Research Reactor. All discharges to the North Sea from the whole site take place through the same discharge point.

NO1 - There are only some small amounts of discharges as a result of washing the quayside following the unloading of raw materials from cargo ships at the production facility

NO2 - There is production of steel in Norway. However, there is still a need to investigate further whether they have any discharges of radioactive materials.

PT1 - Delay tanks are in use. There are discharges but they are not reported to OSPAR because of the very small amounts.

PT2 - These sectors were not regulated in the previous legal framework. In the next years we will be able to characterize the discharges and evaluate the necessity to report to OSPAR.