

Overall summary and conclusions by evaluation panel	
Topic	Assessment (present, qualitative, quantitative, exhaustive data; detailed description; schemes, substantiated justification, based on feedback ...)
BAT/BEP Presence of requirements regarding the application of BAT in the CP's regulation	
	This topic has been discussed in the following sections of the report based on current national regulatory frame: Section 2.1 Royal Decree 1217/2024 (Nuclear and Radioactive Facilities) Article 12.2 establishes that the licensee must continuously ensure the improvement of the nuclear safety and radiation protection conditions of its facility. To this end, the Best Available Techniques (BAT) and practices must be analysed, in accordance with the requirements that the CSN establishes, and implemented when suitable as required by the CSN. Section 2.2.4 The CSN instruction IS-26, of 16th June 2010, sets the basic nuclear safety requirements applicable to nuclear installations, among which: • Points 3.19 to 3.21: A Periodic Safety Review (PSR) programme has to be performed on a ten year basis by the licensees. The goal of the PSR is to carry out an overall assessment of the behaviour of the installation during the considered period by means of a systematic analysis of all nuclear safety and radiological protection aspects. Also, the nuclear installations must carry out the appropriate modifications to converge, wherever it is feasible, with the best international nuclear safety and radiological protection practices and standards in effect at the time. • Points 3.24 to 3.27 deal with dose constraints: the release of radioactive effluents into the environment must comply with the established limits, aiming for them to be as low as possible by taking socioeconomic factors and the best available techniques into consideration.

Inventory of radioactive liquid effluents	This topic is discussed along the report both in a qualitative and quantitative manner, based on available data in CSN data bases and provided by the licensees. Exhaustive data is presented from 2019 to 2024 in GBq/year in Tables 7-8 (Almaraz NPP), 15-16 (Trillo NPP), 23 (Juzbado FFP) and 30 (José Cabrera NPP). All data available online on the ODIMS database for nuclear sector. Also, a detailed description is provided in sections as follows: <i>Almaraz NPP (Section 3.1.2.4):</i> From 2019 to 2024, liquid effluents show a slight decline in total activity (excluding tritium), with normalized values below UNSCEAR 1998–2002 and slightly above UNSCEAR 2008 until 2022. Tritium activity remains steady, with normalized values fluctuating around both UNSCEAR references. <i>Trillo NPP (Section 3.2.2.4):</i> Absolute total activity excluding tritium in the radioactive liquid effluents exhibits a downward trend except for the year 2024, with values lower than the UNSCEAR reference values given in the UNSCEAR 2008 report for the years 1998–2002 and in the UNSCEAR 2016 report for the year 2010. <i>Juzbado FFP (Section 4.1.2.4):</i> Total alpha activity in the liquids effluents presents a slight downward trend. No reference data are published for fuel fabrication plants. <i>José Cabrera NPP (Section 5.1.2.4):</i> Discharges and emissions are due to the dismantling works. Activity in the liquid effluents presents a downward trend. No reference data are published for plants under dismantling.
Description of BAT/BEP system(s) in place	This is discussed in the report in the hereafter referenced sections. The information is based both on direct feedback from licensees and information collected from PSR report in the case of Juzbado FFP For a detailed description see Sections 3.1.2.2 (Almaraz NPP), 3.2.2.2 (Trillo NPP), 4.1.2.2 (Juzbado FFP) and 5.1.2.2 (José Cabrera NPP).
Elements of justification for the use of the selected BAT/BEP system(s)	Refer to the abovementioned sections (BAT/BEP system description) and complemented by section 2.2.4.

Efficiency of abatement systems	This information has been quantified in dedicated tables for each facility. Refer to the following tables: <i>Almaraz NPP</i>: Table 6. <i>Trillo NPP</i>: Table 14. <i>Juzbado FFP</i>: Table 22. <i>José Cabrera NPP</i>: Table 29.
Review of research & development	This topic is not covered in the report, since it is not specifically included in the guidelines of agreement 18-01.
General aspects (from OSPAR recommendation 2018/01)	
Recommended to take account of: Legal, technical and monitoring changes implemented in the period covered by the report, which affect BAT and BEP	As derived from the contents of the report, whenever and if, a licensee implements changes affecting BAT/BEP, a description of these changes has been included in the report. Legal changes in the period have also been described in section 2.2.
Recommended to take account of: Monitoring procedures and methodology (compared with recommendation from international organisation), which affect BAT and BEP	As derived from the contents of the report, all licensees implement policies to minimise effluents that include aspects such as the revision of the operating procedures, improvements in the procedures of sampling and analysis and of the effluent management and control. These policies are subject to quality assurance and control programs.
Data on discharges and concentration	
Period covered by the report (at least from the year following those covered in the previous report, up until the penultimate year before the report is presented to RSC, and at least a 6-year period)	2019-2024

Comparison of discharge data to international references and state of the art (i.e. UNSCEAR: data for tritium and total beta normalised to electrical output)	See Summary Evaluation at the end of Sections 3.1.2 (Almaraz NPP), 3.2.2 (Trillo NPP), 4.1.2 (Juzbado FFP) and 5.1.2 (José Cabrera NPP). Data are compared to UNSCEAR reference values for NPP (there are no reference values for FFP or plants under dismantling): <i>Almaraz NPP</i>: Tables 8 and 9. liquid effluents (normalized values) below UNSCEAR 1998–2002 and slightly above UNSCEAR 2008 until 2022. Tritium activity (normalized values) fluctuating around both UNSCEAR references. <i>Trillo NPP</i>: Tables 16 and 17. Absolute total activity excluding tritium in the radioactive liquid effluents lower than the UNSCEAR reference values (report) for the years 1998-2002 and in the UNSCEAR 2016 report for the year 2010.
Airborne discharges (nuclides with half-life >30 days; as a minimum: H-3, C-14, I-129)	See Tables 9 (Almaraz NPP) and 17 (Trillo NPP) and 23 (Juzbado FFP) (only alpha-emitting isotopes in the airborne discharges in Juzbado).
Description and explanation of any lack of data	Not applicable.
Discussion on any failure to meet BAT/BEP indicators and measures taken to meet them	Not applicable.
Dose estimates	
Methodology for estimation of annual average dose to the public, comprising total exposure, including from historical discharges/emissions	See Sections 3.1.4.5 (Almaraz NPP), 3.2.4.5 (Trillo NPP), 4.1.4.5 (Juzbado FFP) and 5.1.4.5 (José Cabrera NPP). Same methodology in all plants: calculation models given in the NRC-Regulatory Guide 1.109 (computer programs adapted from NRC LADTAP and GASPAR).
Definition of representative person and considered pathways	See Sections 3.1.4.3 (Almaraz NPP), 3.2.4.3 (Trillo NPP), 4.1.4.3 (Juzbado FFP) and 5.1.4.3 (José Cabrera NPP). Same methodology in all facilities: The representative person is hypothetical but realistic, having combinations of habits, both maximum and average, based on local knowledge and plausible assumptions.

Site-specific annual average dose in the period covered by the report (at least a 6-year period)	<i>Almaraz NPP (Table 13)</i>: Taking into account liquid and gaseous effluents, the highest dose in the period of time considered in this report was 7.18E-04 mSv/y in 2023 (0.4 % of the release limit). <i>Trillo NPP (Table 21)</i>: Taking into account liquid and gaseous effluents, the highest dose in the period of time considered in this report was 1.13E-03 mSv/y in 2023 (1.1 % of the release limit). <i>Juzbado FFP (Table 27)</i>: Taking into account liquid and gaseous effluents, the highest dose in the considered period of time has been 2.38E-05 mSv/y (0.02 % of the release limit). <i>José Cabrera NPP (Table 33)</i>: Taking into account liquid and gaseous effluents, the highest dose in the period of time considered in this report has been 5.53E-05 mSv/y (0.1 % of the release limit).
Description and explanation of any lack of data	Not applicable.
Discussion on any failure to meet BAT/BEP indicators and measures taken to meet them	Not applicable.
Commentary from evaluation panel	
Questions raised by evaluation panel	Responses to questions by Contracting Party
Q1. Maybe it should be commented if there have been no discharges of I-129 since it is specified to be included as a minimum in airborne discharges?	For each installation, except for the fuel fabrication facility, a paragraph has been added to the sections "Any relevant information not covered..." with the isotopes that have been detected in the analysis period.
Q2. page 18, section 3, since the sentence says "Three Spanish nuclear power plants discharge their radioactive liquid effluents into rivers that flow into the Atlantic Ocean: Almaraz NPP, Trillo NPP and José Cabrera NPP." It is a bit confusing that there is only two NPP in the map.	The map (now in page 19) has been revised and the text updated to indicate that the information related to José Cabrera NPP is in Section 5.
Q3. In the tables relating to the treatment system and its efficiency, there is a column entitled "decontamination factor," and for filters, this column shows the efficiency in %, we believe. Wouldn't "decontamination factor or efficiency (%)" be more accurate?	The column name in the tables has been changed to "decontamination factor or efficiency (%)" according to the proposal.

Q4. Why is ⁵⁴ Mn present in the title of the tables 10, 11, 12, 19, 20, 21, 30, 31, 32?	⁵⁴ Mn has not been detected for years. This is why it is not included as a radionuclide of concern.
Q5. In all of the squares for “Summary evaluation” in Environmental impact it refers to reporting levels in section 2.4.1 which probably should be 2.5.1?	2.5.1 is the right reference and the text has been reviewed.
Q6. In section 3.1.4.3 the last sentence says “During the period 2019-2024 the critical group living in the vicinity of Almaraz NPP has been the adult for the years 2019 and 2020 and the infant for the years 2021-2024.” Is this really, correct? does the critical group change? Or should it maybe be the age group in the critical group receiving the highest dose that change between years?	As it is suggested, what has really changed between years is the age group within the critical group receiving the highest dose; the paragraph has been reviewed in accordance.
Q7. The guidelines regarding the BAT report suggest that measured environmental concentrations might be compared to OSPAR derived environmental quality criteria. A discussion on that topic might have been beneficial for the report.	Additional text and graphs in sections 3.1.3.1, 3.2.3.1, 4.1.3.1 and 5.1.3.1 have been included.
Q8. The description of reporting limits is quite short. Spain could consider a more thorough description of how these reporting limits are derived and how they are used as this could be interesting information to the other CPs.	Additional text has been included in section 2.5.1.
Q9. P19. It is stated that <i>After condensation of the steam, depending on the activity level, the residual gas passes through a HEPA filter, a carbon bed and another HEPA filter to remove suspended particles and retain most of the iodine.</i> What are the different choices that are based on activity level? How much impact on the dose has the choice of activity level that decides how the gas is treated? Spain could consider explaining this a little bit more.	Report has been revised in section 3.1.2.2.

Q10. Discharges and emissions seem generally lower for Trillo NNP compared to Almaraz NPP. Yet the total doses to the representative person are higher? There is also a difference in that doses from Trillo NNP is dominated by H-3 in liquid releases and by C-14 and emissions to air for Almaraz NPP. Spain could consider to give a short discussion on these differences in both releases and doses.	Releases from Trillo NPP compared to Almaraz NPP are lower since the PWR technology is different (PWR-KWU vs. PWR-Westinghouse). Additionally, dose calculations are influenced by a set of other site-specific parameters, besides activity, that differ from one site to another. No detailed discussion concerning all these differential aspects has been added into the report.
Q11. P22. The target values are partly increasing over this period. Spain could consider giving a short discussion on the reasons behind temporarily increased target values.	A brief clarifying argumentation has been included in this section.
Q12. Comparing Chapter. 3.1.4.1 and 3.1.4.3: what is the difference between the “most exposed member of the public” and the defined “representative person”, later described as the “reference group”?	An explanation has been included in section 2.3.3. Also, additional review has been made to sections 3.1.4, 3.2.4, 4.1.4 and 5.1.4 for clarity.

Q13. Chapter. 3.1.2.7 and 3.2.2.7: licensees establish yearly target values for radioactive liquid effluents. Why do these target values differ yearly? What is the logic behind these target values? How do the authorities supervise these target values? In the report, target values from 2023, hence not the whole reporting period, are reported: were they newly introduced that year? Why?	The reason these values may vary from year to year is that the operator conducts an analysis of their plant and the operation prevision for the following year. These target values are set taking into consideration trends from previous years and operation planning considering refueling and flexible operation on network dispatch orders as the two main contributors to overall effluent generation. Releases from Trillo NPP are lower since the PWR technology is different than Almaraz NPP (PWR-KWU vs. PWR-Westinghouse). Additionally, dose calculations are influenced by a set of other parameters, besides activity, that differ from one site to another. No detailed discussion concerning all these differential aspects has been added into the report. For example, if refueling is planned for that year, emissions are expected to increase slightly. Similarly, if several flexible operating seasons are anticipated, or if a damaged fuel element has been detected, or if design modifications are needed that could affect treatment systems, or dose calculation parameters (River flow, X/Q, etc.) need to be updated. The plan is reviewed annually. This review is always aimed at reducing activities and doses in accordance with the aforementioned regulations on BAT/BET and the ALARA criteria. The plan is submitted by the licensee to the internal safety committee for evaluation and approval. Subsequently, the regulatory body reviews these values during inspections to determine if the objectives have been met. If the planned values are exceeded, the facility must respond appropriately. The initial criteria only included target values for recent years; however, in response to inquiries, the report has been modified in both sections to include target values for the entire analysis period.
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Q14. Target values are only used for NPP and not for FFP. In light of Spain's experiences of the benefits of setting target values for NPP, has it been considered to use the same concept for the FFP?	Like NPPs, FFPs also have ALARA programs which include Radiological Protection indicators and are directed at workers. However, there are several tools to evaluate the activities emitted and the doses outside the site: through the supervision and control of monthly and annual operating reports to verify compliance with the ODCM, which defines the control program for radioactive effluents and the operational dose restrictions as well as the actions to be taken in case of non-compliance; the specific inspections of radioactive effluents carried out within the Inspection Basic Plan; and the evaluation of the Periodic Safety Review (PSR) program that licensees have to perform on a ten-year basis, where the following indicators are analyzed: activity emitted via gaseous effluents, activity emitted via liquid effluents, and doses due to liquid and gaseous effluents.
Q15. Chapter. 4.1.2.7 and 5.1.4.7: for Juzbado FFP and José Cabrera NPP (in decommissioning), on the other hand, there are no site-specific target values. Why?	Regarding the Juzbado FFP, this has already been answered in the previous question. In the current situation at José Cabrera NPP, there are no established targets due to the absence of emissions (no gaseous emissions are expected, and regarding liquids, there is only one tank available in case any liquid waste is generated).
Q16. Chapter. 5.1.4.9: what is the purpose of the dose limit to the critical group (set at 0.25 mSv/y), compared to the general release limit of 0.1 mSv/y, applicable to all licensees?	As stated in the report, the dose limit at the site boundary is 0.25 mSv/y, of which, due to radioactive effluents, only 0.1 mSv/y per unit should be used. At sites where an ATI (temporary individualized storage of spent fuel) is present, the 0.25 mSv/y limit has been set to additionally take into account the direct radiation from containers at that ATI. This is the case of José Cabrera NPP.
Q17. Why is critical group used instead of representative person? ICRP 60 has been replaced by ICRP 103	An explanation has been included in section 2.3.3. Also, some corrections have been made to sections 3.1.4, 3.2.4, 4.1.4 and 5.1.4 for clarity.
Q18. In page 26, section 3.1.4.5. (as an example, same question for all facilities) it is written that the dose coefficients for intake etc is from Royal Decree 783/2001 and the Euratom Directive 96/29. Why do you not use the Euratom Directive 2013/59 which replaces 96/29? and also says that dose coefficients from ICRP 103 should be used.	The intake dose conversion factors for members of the public have not been published by the ICRP yet. Once they are published, the CSN will issue a resolution establishing that these factors are to be used in dose estimations. In the meantime, the previous factors, based on those currently in force from the ICRP, remain applicable.