Tool: Guidelines for documenting leveraged information

(Step 6. Document leveraged information into Recipient Regulator's review)

Introduction to the tool

This tool (Guidelines for Documenting Leveraged Information) is intended to support implementation of Step 6 of the process introduced in the IAEA TECDOC 2086, Collaborative Reviews and Effective Leveraging[1].

It is the responsibility of the Recipient Regulator (Regulator B in Ref [5]) to document their regulatory decision(s) and to demonstrate that an appropriate level of due diligence has been exercised in leveraging the work of other regulatory bodies (and Source Regulator, or Regulator A in Ref. [5]).

The purpose of documenting information is for the Recipient Regulator to create a reliable record showing how information from the Source Regulator was incorporated into its decision-making process. It also ensures future access and security of information, supporting knowledge management and transparency.

Every regulatory body documents their information; this step, however, addresses additional documentation required when leveraging information from other regulators. It builds on the work done in Step 5 of the process. This document can be seen as an extension of the regulatory body's regular information documentation to ensure accountability.

The objectives of documenting leveraged information are to:

- Demonstrate sovereign independence in safety-related decision-making and show that an appropriate level of due diligence has been performed during leveraging;
- Maintain control of the exchange of information;
- Ensure traceability of information;
- Ensure accountability and transparency to the public (scope and level of detail of the published information is dependent on the national legal framework).

Furthermore, the Recipient Regulator needs to incorporate the leveraged information into their own regulatory decision-making process. The documentation of information should be done in a way that enables the Recipient Regulator's assessors to easily access information supporting further input or support from the Source Regulator.

This tool provides guidelines on how the Recipient Regulator can document their use of leveraged information. Two types of documentation are considered: (1) internal documentation of information, and (2) published (public) documentation of information.

Considerations for agreements about documenting and publishing between the Recipient Regulator, the Source Regulator, applicant and vendor

The IAEA TECDOC 2100, Enhancing Cross-Sharing Framework for Regulatory Reviews of Advanced Reactors [2], outlines guidance on the administrative arrangements that regulatory bodies need to establish for effective information sharing in support of leveraging reviews. This includes the types of agreements required to share controlled information, such as proprietary data and information subject to export control, and the practices for the Recipient Regulator to request information from the Source Regulator in a timely and effective manner and to share lessons learned.

Good practices:

- Identify the scope of the agreement: pre-application, license application safety evaluation report, etc.
- Establish the licensing steps that the agreement will be focused on: siting, construction, operation, etc. Agree on a common statement about collaborative leveraging.
- Ensure that any agreements involving the transfer of controlled information – such as proprietary data or technical details subject to export control – are signed by the appropriate authorised representatives.
- Consider that having common positions on safety criteria is helpful in working together/leveraging.
- Establish what has access to leveraged information (list of users): Agree on what information leveraged from the Source Regulator can be shared with the vendor and applicant.
- Decide on how to manage the communication between the Source Regulator and the vendor/applicant (Design Information Exchange Meetings): see the text below publishing or whether informing them in advance is sufficient.
- Decide on how to manage the Recipient Regulator's communication with the vendor/applicant related to the information from the Source Regulator (e.g. whether the Source Regulator is to be consulted by the Recipient Regulator with respect to such queries, especially if information is to be made public).
- Consider that use of information sharing tools (e.g. SharePoint) may facilitate information sharing and be helpful in determining what information the Recipient Regulator needs to request from the Source Regulator.
- Have a clear understanding of the legal differences pertaining to documentation and archiving (e.g. differences in security level, archive requirements). Depending on these requirements, having documentation on a SharePoint site may be sufficient, but when licenses or decisions are published, information usually has to be archived at the national level.
- Consider the required duration of the assessment and establish a schedule for activities and collaboration, as well as measures to mitigate the risk of discontinuation.
- Agree on the publication plan and the use of the information.

While implementing the necessary agreements and applying the good practices outlined above, the Recipient Regulator may encounter challenges. Some of these challenges are related to information protection, as described below.

Possible challenges regarding documentation and publishing of the information:

- Timely demonstration of the Recipient Regulator's independent decision-making (due diligence) and giving due credit to the work performed by other regulatory bodies.
- Timely documentation or where to document the necessary information (for example, within the text of the license or decision, which is public, or in the Recipient Regulator's internal documentation system).
- Determination of the level of detail necessary for fulfilment of the objective.
- Consideration of the Recipient Regulator's assessment process in the case of divergence between the regulatory bodies.
- Documentation of the opinions by the Recipient Regulator on the work done by the Source Regulator, recognizing the presence of sensitive or challenging issues and treating them with appropriate confidentiality and transparency (see below for more details).
- Differences in the legal frameworks regarding publishing information; for example, this may occur when the Recipient Regulator is legally required to publish their assessment, whereas the Source Regulator is prohibited from making that same information public.
- Disagreements on information sharing between the different stakeholders, particularly when the Source Regulator has agreed to provide information, but the vendor wishes the information to remain confidential (only 'owned' by the Recipient Regulator).
- Ensuring, prior to the formal agreement, that the level of detail of the work is sufficient for the Recipient Regulator to leverage, in order to avoid situations where they need to request additional information from the Source Regulator, which is a loss of detail.
- Accounting for the need to 'prove' operating experience where a regulatory body is not allowed to share operating information, which is also important for other regulators based on similar reactor installations.
- Recognizing that the steps used for leveraging may be presented in TECDOC 2086 [3] are not linear, as this is an iterative process, and that, depending on the specific circumstances, the Recipient Regulator may need to revisit or gaps may later arise, potentially requiring updates to the documented information, including the decision.
- Documenting the work by the Source Regulator in a manner that facilitates its use by other regulatory bodies, including ensuring the quality of essential information, traceability of sources and judgements, and accessibility to external readers or a broader international audience.
- The establishment of an appropriate balance between independent decision-making (due diligence) and giving due credit to the work performed by other regulatory bodies.

Guidelines on documenting leveraged information

The table below provides guidelines on what information to document and/or publish along with an example of its use.

The table is to be completed as follows: Column 1 contains the preparatory work, documenting how the preconditions for leveraging are fulfilled (see Appendix I of IAEA TECDOC 2086 [3]), and subsequently processed through Steps 1 to 5 as presented. This process is intended to determine the information to publish.

- Considering the objectives of documenting and/or publishing information;
- Determining the appropriate level of detail;
- Being as specific as possible;
- Applying the principles described for each step.

Table 1. Examples of issues to be considered during the identification of relevant Source Regulator documentation

Topic	Objective and description	Comments	Level of detail to be published
STEP 1 Documentation of the decision to leverage information from the Source Regulator	Early in the process the parties need to discuss what information can be relevant to the relevant Source Regulator and for how long the Source Regulator can make themselves available for assistance.	The discussion needs to take place before any leveraging activities begin.	Information should be documented in documents with be shared and what information is considered commercial-sensitive, and publicly measures apply. These elements may be determined by the national legal framework and regulatory bodies.
	Objective 1 – Internal: Substantiating the chosen approach The Recipient Regulator may document why it is beneficial to leverage information from the Source Regulator. This can be documented by the following: 1. What design information is leveraged; 2. Describing why gaps in knowledge, time, or capacity of the Recipient Regulator, as well as the type of support needed through the collaboration; 3. Describing how information is used, the decision(s) in Step 1 of Regulatory Cooperation Toolkit (for example, to inform a decision, to support regulatory bodies in licensing newbuilds, nuclear plants and sites, international involvement, and outcomes of Integrated Regulatory Review Service (IRRS) missions and other international missions or reviews); 4. Evaluation of availability of regulations and procedures relevant for leveraging; 5. Comparison with the Recipient Regulator to determine the "fit" and decide on collaboration with the Source Regulator.	The processed benefits of leveraging can influence the decision on development of human resources, acquisition of technical support, and funds for the review. It is also important to consider what the Recipient Regulator can offer within the collaboration, for example, where experience or knowledge on specific issues may be limited. To facilitate the release of information, a commitment to transfer information can be included in agreements. Future improvements of the internal processes of both regulatory bodies and identification of possible obstacles/gaps.	Internal documentation only
STEP 2 Documentation of the decision on undertaking a "deep-dive" regulatory framework review	Objective 1 – External: Explaining external accountability for the chosen approach The documentation may include a comparison of the Recipient Regulator's and the Source Regulator's approaches. This includes: 1. Identification of the topics being compared; 2. List of the codes/standards (e.g. IAEA Safety Standards are applied); 3. List of main differences (e.g. in laws, procedures, design, safety criteria, safety demonstration, post-trented or detailed requirements); 4. Whether the differences are qualitive or quantitative; 5. Identification of gaps in assessment approaches; 6. The gaps in the framework of the Recipient Regulator; 7. The approach used in the comparison, including the references used; 8. The consideration of non-nuclear systems, structures and components (including design, including non-nuclear regulations that are not necessarily enforced by national nuclear regulatory bodies. For example, environmental safety and chemical regulations may include requirements for pressure boundaries such as chrysotile asbestos in gaskets and breakers and fluorochyl (PFAS) substances used in seals and lubricants.	It is important to stress that comparisons are made because they form the basis for the leveraging activities and assessment conclusions. Comparisons may be necessary, as the analyses may change when moving to the next steps. Joint products, reports, and other outputs developed by collaborating regulatory bodies are generally published and discussed. Information that is leveraged as part of a licensing decision may be part of the decision and need to be credited appropriately.	It is expected that the public is informed of the reasons for leveraging information from the Source Regulator. Public having information may remain high level (conclusion), while internal accountability requirements may be more detailed and may include sensitive content.	High level explanation only
	Objective 2 – External: Ensuring external accountability for the chosen approach A description needs to be provided of how the analyses of divergence were conducted and what general conclusions were. A summary of the divergences may be documented.	Confidentiality and publicity measures need to be determined in advance, based on the national legal framework of the regulatory bodies involved.	High level external summary only
STEP 4 Assessment of the information quality	Objective 1 – Internal: Substantiating the chosen approach The implications of the divergences on safety and the impact on the project may be documented. This includes: 1. The approach adopted to determine the impact; 2. The categories of impacts that are applied and how are the impacts categorized; 3. The impact of the divergence on possible design changes; 4. The effort required to leverage the information; 5. The scope of the review needed to ensure alignment between the scope of assessment performed by the Recipient Regulator and that provided by the Source Regulator.	Divergences may lead to design changes or require modifications to certain assumptions. Further detailed analyses may be necessary, and an iterative approach to determine impacts may differ between the pre-licensing and licensing phases. The flow chart of Fig. 3 in TECDOC 2086 [3] may be used to document these considerations.	Internal documentation only
	Objective 2 – External: Ensuring external accountability for the chosen approach	Statements regarding the impact of divergences may be sensitive and need to be communicated carefully.	High level information only
STEP 5 Categorization of information	Objective 1 – Internal: Substantiating the chosen approach The Recipient Regulator may document the compatibility of their quality assurance processes with the Source Regulator's processes. This includes: 1. Considerations applied when assessing the quality of the information (see Step 4 in Ref. [5]); 2. Additional information requested and sources of information (for example, see Appendix III for information to the Source Regulator; Appendix III); 3. Conclusions reached regarding the need to adjust the Recipient Regulator's own assessment processes, licensing procedures, or other regulatory practices.	The Recipient Regulator needs to assess whether the quality assurance process of the Source Regulator meets the requirements of the definition of the specific basis for the quality assurance process. This can be documented in the criteria and standards (including the foundation for assessing quality).	Internal documentation only
	Objective 2 – External: Ensuring external accountability for the chosen approach	Communicating regarding the information quality requirements may be sensitive, and external communication needs to be limited to high-level information.	High-level external statements only
	The objective is to document the justification for categorizing information as Type 1 or Type 2 and associated reporting requirements. The documentation of this categorization and associated justification needs to confirm the obligation to protect sensitive information, while ensuring transparency and accountability, maintaining an appropriate balance between different levels of sensitivity. Step 5 in Ref. [5] proposes considerations for the categorization of information, including the impact on the Recipient Regulator's own assessment and sensitivity/confidentiality. Key aspects in document include: 1. Considerations for categorizing the information as Type 1 or Type 2; 2. Description of the approaches used to leverage information under Type 1 and Type 2; 3. Conclusions of the leveraging process; 4. Summary of the entire leveraging process and conclusion on how sovereignty is maintained. This summary may also be used to inform the public.	While publishing relevant information, it is important to consider the national legal framework, example regarding how long documents are provided in TECDOC 2100 [2]. It is important to document the actions of the Recipient Regulator, both to complement the work of the regulatory body and to record any new findings or additional experience gained. Given the volume of information collected, providing a clear and comprehensive summary is crucial.	High-level external summary and detailed internal justification

Appendix I

Examples and good practices for agreements on information sharing

Scope and objectives of the regulatory cooperation

This section introduces the main elements that the Source Regulator and the Recipient Regulator establish a clear and shared understanding of what the cooperation agreement covers and how the information will be used and documented, together with illustrative examples (M, Non-mandatory):

- Identification of the scope of the agreement (e.g. pre-application, license application, safety evaluation report).
- Establishment of the licensing steps covered under the arrangement (e.g. siting, construction, operation).
- Agreement on the final product and the use of the information.
- Agreement on a common statement on collaborative leveraging.
- Establishment of common positions on safety criteria to facilitate collaborative/leveraging.
- Consideration of the expected duration of the leveraging review and regulatory assessment, including scheduling of activities and cooperation, as well as measures to mitigate the risk of discontinuation of the agreement.

Example of scope of the agreement

Unclassified technical information exchange

To the extent permitted under the laws, regulations, and policies of their respective countries, the Parties may cooperate and exchange unclassified technical information relating to: …<kbd>Fill in the scopes</kbd>.

Examples of such information include:

…

…

Example of a common statement on the cooperation framework

Cooperation in …

The terms of cooperation for joint … under which activities are divided between the two Parties, including the use of … , newed by either Party, shall be considered on a case-by-case basis in the conduct of a mutual review agreement.

Example of common positions on safety criteria

A common position on safety criteria can be established by referencing the IAEA safety requirements and guidance documents.

Controlled information

This section focuses on main elements on how controlled information is handled with illustrative examples. Additional information can be found in the IAEA TECDOC 2100 [2] and IAEA Nuclear Security Series No. 23-G.

- Ensuring that any agreements involving the transfer of controlled information – such as proprietary data or technical details subject to export control – are supported by the appropriate authorised representatives (signatories).
- Having a clear understanding of legal differences pertaining to documentation and archiving (e.g. differences in security levels and archive requirements). Depending on these requirements, having documentation on a SharePoint site is sufficient, but when licenses or decisions are published, information usually has to be archived at the national level.
- Establishing who has access to internally shared information (information is only available to a list of authorized users).

Example of common statements on controlled information

Definitions

The term 'information' means unclassified technical information relating to <scope>. It also includes scientific or research data, assessment methodologies, and any other information provided, created, or exchanged under this Arrangement.

The term 'proprietary information' means information provided, created, or exchanged under this Arrangement that contains trade secrets or other non-public commercial information.

The term 'other confidential or privileged information' means non-public information, other than proprietary information, that is provided, created, or exchanged under this Arrangement, or pertains to the operations of the Party transmitting the information under this Arrangement.

Documentary proprietary information

- A Party receiving documentary proprietary information shall respect the confidential and privileged nature of such information.
- Marking procedures is applied for documentary proprietary information.

Other confidential or privileged information of a documentary nature

- A Party receiving other confidential or privileged information of a documentary nature shall respect the confidential nature of such information.
- Marking procedures is applied for other confidential or privileged information of a documentary nature.

Non-documentary proprietary or other confidential or privileged information

- Non-documentary proprietary or other confidential or privileged information provided, obtained, or transmitted under this Arrangement shall be treated by the Parties according to the principles specified for proprietary information in Article XXX, and as specified in the implementing arrangements or other documents. Such information shall be identified as provided, however, that the transmitting Party has placed the receiving Party on notice as to the character of the proprietary or other confidential or privileged information contained therein.

- Either Party may ask the other Party in writing to delay publication or public disclosure of such documentation or information for the purpose of protecting its rights.

Publication and dissemination of information

This section outlines the key considerations to guide the Parties in determining how information exchanged under this cooperation arrangement may be disseminated or published. Illustrative examples:

- Deciding on how to deal with the publication process. For example, whether the Source Regulator and/or the vendor (Design Information Service) would review the text before publishing, or whether prior notification is sufficient.
- Agreeing on what information leveraged from the Source Regulator by the Recipient Regulator can be published.
- Using information sharing tools, e.g. SharePoint, to distribute information leveraged and to keep a record of information which the Recipient Regulator wishes to disclosure or publish.
- Determining how responsibility for public participation will be addressed, including how to manage public comments that reference information from the Source Regulator (e.g. whether the Recipient Regulator needs to consult the Source Regulator in such cases).

Example of common statements on publication and dissemination of information

General

The Parties support the widest possible dissemination of information exchanged under this Arrangement, subject to the requirements of each Party's national laws, regulations, and policies, and the need to protect proprietary and other confidential or privileged information. However, consistent with these national laws, regulations, and policies, the Parties reserve the right to impose, on a case-by-case basis, additional restrictions on the dissemination of information beyond those identified in this Article.

The treatment of intellectual property furnished, created, or exchanged under this Arrangement is provided for in the Intellectual Property Rights (IP) annex which sets out additional conditions under this Arrangement unless agreed otherwise by the Parties in writing.

Dissemination of documentary proprietary information

- The receiving Party may disseminate documentary proprietary information received under this Arrangement without the prior consent of the transmitting Party to employees of the receiving Party, and to other agencies and departments of the government of the receiving Party, provided that …
- The receiving Party may only disseminate documentary proprietary information more widely than otherwise permitted under the terms set forth in this Arrangement, including to contractors and consultants of the receiving Party, and to committees or licensees of the receiving Party, with the prior written consent of the transmitting Party. The Parties shall endeavour to grant such approval to the extent permitted by their respective national laws, regulations, and policies, and provided that …
- Each Party shall ensure the public's right to participation and, for that purpose, commits to implement open and inclusive participation in decision-making processes based on domestic and international normative frameworks.

Example of good practices for how leveraging is understood and documented in UK GDA reports

Leveraging in SMR and EPR GDA Step 4

The UK Office for Nuclear Regulation (ONR) includes the fundamental assessment of the BWRX-300 SMR design through a 2-step Generic Design Assessment (GDA) and assessed a UK-specific design for the Sizewell C EPR. The regulatory expectations are documented in the Regulatory Assessment Milestones (RAMs) and are assessed against a Step 4 (T2), and is underpinned by the Technical Assessment Guides.

A good practice in the documentation of T2 topics, which are based on the Safety Assessment Principles (SAPs), Technical Assessment Guides (TAGs) and regulatory Guidance (in this case the Generic Design Assessment Guidance for Nuclear Reactors Construction (GND2) and the United Kingdom Nuclear Regulatory Commission (U.S. NRC) under the mutual Technical Cooperation Arrangement) is that the topics are broken down into specific sub-topics. For example, the Fuel Handling Section 3.4 of the GDA summary reports outlines how the UK ONR took credit for:

- The U.S. NRC and CNSC's joint report on diaphragm plate crack comparison (DP-42) advanced construction techniques;
- CNSC's insights into additional demonstration on break exclusion zones, supporting the judgement that limitations in the UK GDA Safety Journey Regulations and Guidance (SJR2) mean that there is a requirement for the design to use credible solutions are being progressed elsewhere and can be incorporated in the UK in the future);

The GDA summary reports also outlined the UK ONR's expectations for future interventions on the vendor's integrated quality arrangements and management during GDA with the U.S. NRC and CNSC and benefitted from similar exercises in the United States and Canada. It also highlighted the U.S. NRC's and CNSC's GDA assessment of the Westinghouse Electrical Company's (WEC) Fuel Handling System design of the BWRX-300 as being of high quality, leveraging the potential for regulatory efficiencies in future assessments.

The assessment reports from individual technical disciplines (S) review these practices, as illustrated in Appendix 1 of the Fuel Studies and Fuel Route Accident Analysis Report (T2). The assessment report also lists the UK ONR's review and acceptance of the Contractors' evaluation methods' addressing loss of coolant accidents (LOCAs) into containment mass equations in (RAMs) Technical Assessment Guides on Design Basis Analysis (T2).

Example of good practices for documenting leveraged reviews in the United Arab Emirates

The following is an example of a good practice from the United Arab Emirates Nuclear Regulator, the Federal Authority for Nuclear Regulation (FANR), of the United Arab Emirates (UAE) to leverage the regulatory review, categorised as Type 2 (see Step 5 in Part 3D), completed by the Source Regulator, the Korean Institute of Nuclear Safety (KINS) of the Republic of Korea.

The KINS provided Safety Evaluation Reports (SERs) in accordance with the Memorandum of Understanding between the UAE and the Republic of Korea. The FANR used the KINS review and evaluation of this area of review as the basis for its own review, and the subsequent conversion system for the SER provided to FANR was leveraged by FANR during the review process of the licensing application. It was determined that it provided an adequate basis for accepting the KINS's review in line with Type 2 categorisation.

The review performed by the FANR was carried out relies on the FANR of the responsibility to reach their own regulatory conclusions to ensure that their regulatory requirements were met. The conclusions of the FANR were based on an understanding of the regulatory requirements applied by the KINS and of the reviews supporting conclusions reached by the KINS.

The FANR document their findings in the SER using the Type 2 categorisation template (provided in Appendix 6), completing the dedicated section for the source regulator's review and the subsequent acceptance by the FANR. The FANR also provided a dedicated section in the FANR for the expert and power conversion. For the specific area under review, the KINS's SER was referenced in the FANR's SER, together with additional supporting documents.

Example of Type 2 categorisation template completed by the FANR for the steam and power conversion system

10	**Steam and power conversion system**
10.3	**Main steam system**
10.3.6	**Steam and feedwater system materials**
10.3.6.1	**Area of review**

Emirates Nuclear Energy Company (ENEC) addressed this area of review in Barakah Units 1 and 2 Preliminary Safety Analysis Report (PSAR) Section 10.3.6, summarised here in part, as follows:

The application describes material selection, fabrication, and fracture toughness for materials used in the steam and feedwater systems.

The application discusses materials that are used and that are not used throughout various sections of the steam and feedwater systems.

Cleanliness requirements and acceptance criteria for secondary system piping are also addressed.

The application also discusses non-destructive examination procedures for subject components.

KINS addressed this area of review in Shin Kori Units 3 and 4 SER Section 10.3.6, which is the reference point for Barakah Units 1 and 2.

10.3.6.2	**SER review interface**

This section of the SER interface with the following other sections of the PSAR:

1. The review of the adequacy of programmes for assuring the integrity of tooling and threaded fasteners is performed under Section 10.3.5.
2. The systems and components discussed in Section 10.3.6 are reviewed in Sections 3.7.1 and 3.7.2 for consistency with seismic classification and quality group requirements.
3. Surveys of this section's interface with other topics are reviewed in Section 3.6.1.

10.3.6.3	**Regulatory basis**

The applicable FANR regulations for this area of review are provided below. In addition to UAE Federal Law by Decree No. 6 of 2009, these regulations provide the legal basis of acceptance.

FANR regulatory guides provide:

- Guidance to applicants on acceptable means of compliance with specific articles of FANR regulations;
- Insights into the review methodology used and data required by FANR staff in its review of licence applications.

The FANR regulations that form the UAE's nuclear law for Section 10.3.6 are provided below.

10.3.6.3.1	**Applicable FANR regulations**

The FANR regulations that are applicable to this area of review:

1. FANR-REG-03, "Regulation for the Design of Nuclear Power Plants," Articles 11, 16, 20, and 21.
2. FANR-REG-04, "Regulation for Application for a License to Construct Nuclear Facility," Article 6.

10.3.6.3.2	**Review guidance and industry standards to meet FANR regulations**

The following regulatory guidance documents and industry standards can be used to meet the applicable FANR regulations for this area of review:

1. FANR-REG-GD1, "Content of Nuclear Facility Construction and Operating Licence Applications,"
2. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 10.3, "Main Steam System," Revision 2, March 2007.
3. ASME Boiler and Pressure Vessel Code (BPVC) Section III, "Rules for Construction of Nuclear Facility Components," Division 1, "Subsection NB, Class 1 Components," July 2017.
4. ASME Boiler and Pressure Vessel Code (BPVC) Section XI, "Rules for Inservice Inspection of Nuclear Power Plants," Division 1, "Rules for Inspection and Testing of Components of Light-Water Cooled Plants," July 2017.
5. ASME B31.1, "Power Piping."
6. American Society of Mechanical Engineers (ASME) Code, Section III, NC-2000 for Class 2 Materials.

10.3.6.3.3	**KINS regulatory basis**

The following references for this area of review were cited or incorporated by reference in the SER for Shin Kori Units 3 and 4 Preliminary Safety Analysis Report (PSAR) Section 10.3.6, which is the reference point for Barakah Units 1 and 2. The regulatory requirements listed in Section 6 of the Korean Law of Nuclear Facility Safety Management for Nuclear Power Facilities, there are comparable requirements in the UAE's laws.

1. Article 31 (Reactor Coolant Pressure Boundary) of the Korean Regulations on Technical Standards for Nuclear Reactor Facilities, etc.;
2. ASME Section III Subsection NC, ND;
3. ASME Section II Part A, D, and II;
4. U.S. NRC RG 1.37 "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water Cooled Nuclear Power Plants";
5. U.S. NRC RG 1.71, "Control of Preheat Temperature for Welding of Low Alloy Steel";
6. U.S. NRC RG 1.70, "Written Application for Areas of Limited Accessibility";
7. Noted that there are the same criteria in the APR1400 Standard Safety Analysis Report (SSAR).

10.3.6.4	**Technical review**

FANR Review Category 2 has been designated for this SER section in accordance with the guidance provided in FANR-CP-2, Revision No. 1, "Licensing Management Procedure," dated 04 November 2010. As specified in CP2 Section 7.4, the FANR staff reviewed the evaluation performed by KINS SER Section 10.3.6 for the reference Shin Kori Units 3 and 4, and by ENEC for this section in the Barakah Units 1 and 2 PSAR.

10.3.6.4.1	**Regulatory requirements**

FANR has evaluated KINS SER Section 10.3.6 to determine if the KINS regulatory requirements associated with this area of review are consistent with those of FANR. The FANR evaluation is documented below.

The review includes complying the FANR-REG-03 requirements, Fracture Toughness, and ASME BPVC Section III, "Regulation for the Design of Nuclear Power Plants," as specified for the steam and feedwater system materials. While there is not an exact correlation to articles in the Korean Regulations on Technical Standards for Nuclear Reactor Facilities, there are comparable requirements in the UAE's laws as follows:

FANR Article 11 (Safety Classification) and Article 20 (Design Rules) specify that structures, systems, and components (SSCs) must be designed according to internationally recognised codes and standards. The SSCs that are important to safety should be classified according to their safety significance. Article 11 specifies that the classification should follow the IAEA's Article 12 (Safety Classes and Standards) in the Korean Regulations for Nuclear Reactor Facilities, etc.

FANR Article 16 (Other Internal Hazards) describes internal hazards, such as flooding, missile generation, and pipe whip, and specifies that these internal hazards must be considered in the design. This is consistent with Article 32 (Environmental Effects Design Bases).

FANR Article 21 (Design Limits) states a set of design limits consistent with the key physical parameters for each SSC shall be specified for operational states and design basis accidents. This requirement is consistent with KINS Article 22 (Reactor Coolant System) paragraph (2).

It should be noted that the KINS SER Section 10.3.6 lists KINS Article 21 (Reactor Coolant Pressure Boundary) as a requirement. This is not a requirement in the UAE's laws, but it is a requirement in the Korean Regulations on Technical Standards for Nuclear Reactor Facilities, etc. previously. However, FANR Article 20 (Reactor Coolant Pressure Boundary) covers the requirements of KINS Article 21 (Reactor Coolant Pressure Boundary).

While KINS Articles 12 (Safety Classes and Standards), 15 (Environmental Effects Design Bases), and 22 (Reactor Coolant System) are not specified in KINS SER Section 10.3.6 as review requirements, it is assumed that the requirements must still be met. Therefore, FANR staff have concluded that the KINS regulatory requirements associated with this area of review are consistent with those of FANR.

10.3.6.4.2	**Technical basis**

FANR has evaluated KINS SER Section 10.3.6 to determine if the technical basis for the KINS SER review and evaluation of this area is clearly described and acceptable to FANR. That FANR evaluation is documented below.

The areas of KINS review included:

1. Selection and manufacture of materials;
2. Fracture toughness;
3. Assessment of impact of erosion and corrosion.

KINS concluded that materials for the steam and feedwater system comply with relevant technical standards and reflect results of erosion and corrosion assessments, thereby meeting regulations.

Specifically, KINS concluded that:

1. The materials of which the steam and feedwater system is manufactured meet the specifications specified in ASME Section III, Appendix I, thereby meeting relevant criteria. Preheating requirements for low alloy steel and carbon steel equipment associated with KINS Article 21 (Reactor Coolant Pressure Boundary) and Appendix B (Quality Assurance) are met. Follow KR-1.71, thereby meeting KINS requirements.
2. Fracture toughness requirements for carbon steel and low alloy steel comply with ASME Section III NC 2000, thereby meeting KINS requirements.
3. Erosion and corrosion impacts were assessed to ensure that the erosion and corrosion of carbon steel pipes in an areas highly vulnerable to erosion and corrosion, like elbows, meet KINS SER Section 10. PCC, etc.) are not compromising suitability.

It is noted that Section 10.3.6 of the Barakah Units 1 and 2 PSAR is almost identical to Section 10.3.6 of the APR1400 SSAR. Super austenitic stainless steel has been added as a tube material for Barakah Units, consistency of dissimilar metals is obviates. This is considered an acceptable, since there are super stainless steels that are equivalent of titanium. Carbon steel has been replaced by low alloy steel (SA335 Gr. P11). Appendix B (Quality Assurance) requirements, which have been accepted by KINS.

Based on the above, FANR concludes that the KINS review forms a sufficient technical basis to accept these aspects of the Barakah design as described in PSAR Section 10.3.6.

10.3.6.4.3	**Plant design or operational changes**

FANR has evaluated PSAR Section 10.3.6 to determine if sufficient information was provided by the applicant to confirm that there are no plant design or operational changes identified in the application that have significant impact on nuclear safety. The FANR evaluation is documented below.

There are no plant design or operational changes identified in the application that have significant impact on nuclear safety.

10.3.6.4.4	**Safety issues and operating experience from Supplement 2 of the PSAR**

There are no Safety Issues from Supplement 2 of the PSAR applicable to this area of review for Barakah Units 1 and 2.

10.3.6.4.5	**SER interface evaluation**

FANR has evaluated the FANR SER interface with other sections of the PSAR to ensure that the review of Barakah Units 1 and 2 PSAR, as identified in the above SER Section 10.3.6.2, FANR has reviewed these interfaces for consistency and potential safety implication. FANR's findings on the key interfaces with potential safety implication are evaluated below.

The interfaces with PSAR Section 3.7 regarding seismic and safety classification and Section 3.5 regarding threaded fasteners are consistent.

Dynamic effects associated with the postulated rupture of piping for high energy line breaks due to rupture of main steam piping outside containment are addressed in Section 3.6.1. Protection against dynamic effects associated with the postulated rupture of piping must impact their design function not affect reactor coolant component operability. The design features that enabled this conclusion included separation, physical barriers or shields, and piping restraints.

10.3.6.5	**ENEC conditional acceptance items**

No commitments to be completed after issuance of the construction licence were made by the applicant related to this area of review.

10.3.6.6	**Conclusions**

The FANR staff reviewed PSAR Section 10.3.6 of the Barakah Units 1 and 2 construction licence application, subsequent application material, and the KINS SER Section 10.3.6 for Shin Kori Units 3 and 4 related to steam and feedwater system materials.

The FANR staff has determined that KINS regulatory requirements associated with this area of review are consistent with those of FANR and the technical basis for the KINS SER review and evaluation of this area is clearly described and acceptable to FANR. In addition, FANR has determined that the application does not identify any plant design changes or operational changes that have significant impact on nuclear safety.

On this basis, FANR has determined that PSAR Section 10.3.6 of the Barakah Units 1 and 2 construction licence application has been appropriately completed as Category 2 and that the KINS SER review of the reference plant forms a sufficient basis for FANR to determine the acceptability of Barakah Units 1 and 2 in the UAE.

10.3.7	**Open items**

There are no Open Items to be addressed prior to issuance of the construction licence.

Appendix 1 to SER Section 10.3.6
Reason for additional information status

There were no requests for additional information (RAI) made.

Appendix B
FANR template for documenting leveraged information for Type 2 categorisation

X Chapter title	
X.X.Z Title	
X.X.Z.1 Area of review	

ENEC addressed this area of review in **Barakah Units 1 and 2** PSAR Section ___ summarised here in part, as follows:

[PROVIDE INPUT]

X.X.Z.2 SER review interfaces	

This SER section interface with the following other sections of the PSAR:

1.
2.
3.

OR

This SER section does not interface with any other section of the PSAR.

X.X.Z.3 Regulatory basis	

The applicable **FANR** regulations for this area of review are provided below. In addition to **UAE Federal Law by Decree No. 6 of 2009**, these regulations provide the legal basis of acceptance.

FANR regulatory guides provide:

- Guidance to licensees and applicants on acceptable means of compliance with specific articles of **FANR** regulations;
- Insights into the review methodology used and data required by **FANR** staff in its review of licence applications.

The **FANR** regulations that form the UAE's nuclear law for **X.X.Z.3** are provided below.

X.X.Z.3.1 Applicable FANR regulations	

The **FANR** regulations that are applicable to this area of review:

1.
2.
3.

X.X.Z.3.2 Review guidance and industry standards to meet FANR regulations	

The following regulatory guidance documents and industry standards can be used to meet the applicable **FANR** regulations for this area of review:

[PROVIDE INPUT]

1.
2.
3.

X.X.Z.3.3 KINS regulatory basis	

The following references for this area of review were cited or incorporated by reference in the SER for **Shin-Kori Units 3 and 4** construction permit (**SKN3 SER – July 2008**).

[PROVIDE INPUT]

1.
2.
3.

X.X.Z.4 Technical review	

FANR Review Category 2 has been designated for this SER section in accordance with the guidance provided in **FANR-CP-2**, Revision No. 1, "Licensing Management Procedure," dated **November 2010**. As specified in **CP2** Section **7.4**, the **FANR** staff reviewed the evaluation performed by **KINS** SER Section ___ for the reference **Shin-Kori Units 3 and 4** and by **ENEC** for this section in the **Barakah Units 1 and 2** PSAR.

X.X.Z.4.1 Regulatory requirements	

FANR has evaluated **KINS** SER Section ___ to determine if the **KINS** regulatory requirements associated with this area of review are consistent with those of **FANR**. The **FANR** evaluation is documented below.

[PROVIDE INPUT]

X.X.Z.4.2 Technical basis	

FANR has evaluated **KINS** SER Section ___ to determine if the technical basis for the **KINS** SER review and evaluation of this area is clearly described and acceptable to **FANR**. The **FANR** evaluation is documented below.

[PROVIDE INPUT]

X.X.Z.4.3 Plant design or operational changes	

FANR has evaluated PSAR Section ___ to determine if sufficient information was provided by the applicant to confirm that there are no plant design or operational changes identified in the application that have significant impact on nuclear safety. The **FANR** evaluation is documented below.

[PROVIDE INPUT]

X.X.Z.4.4 Safety issues and operating experience from Supplement 2 of the PSAR	

FANR has determined that the following Safety Issues from Supplement 2 of the PSAR are applicable to this area of review and are evaluated below.

[PROVIDE INPUT]

OR

There are no Safety Issues from Supplement 2 of the PSAR applicable to this area of review for **Barakah Units 1 and 2.**

FANR has determined that the following Operating Experience from Supplement 2 of the PSAR is applicable to this area of review and is evaluated below.

[PROVIDE INPUT]

OR

There is no Operating Experience from Supplement 2 of the PSAR applicable to this area of review for **Barakah Units 1 and 2.**

X.X.Z.4.5 SER interface evaluation	

FANR has evaluated the **FANR** SER interface with other sections of the PSAR to ensure that the review of **Barakah Units 1 and 2** PSAR, as identified in the above SER Section **X.X.Z.2**, **FANR** has reviewed these interfaces for consistency and potential safety implication. **FANR's** findings on the key interfaces with potential safety implication are evaluated below.

[PROVIDE INPUT]

X.X.Z.4.6 ENEC conditional acceptance items	

The following items have been evaluated by **FANR** and are conditionally accepted based on the commitments made by **ENEC**.

[PROVIDE INPUT]

OR

No commitments to be completed after issuance of the construction licence were made by the applicant related to this area of review.

X.X.Z.4.7 Conclusions	

The **FANR** staff reviewed PSAR Section ___ of the **Barakah Units 1 and 2** construction licence application, subsequent application material, and the **KINS** SER Section ___ for **Shin-Kori Units 3 and 4** related to (topic of review).

The **FANR** staff has determined that **KINS** regulatory requirements associated with this area of review are consistent with those of **FANR** and that the technical basis for the **KINS** SER review and evaluation of this area is clearly described and acceptable to **FANR**. In addition, **FANR** has determined that the application does not identify any plant design changes or operational changes that have significant impact on nuclear safety.

On this basis, **FANR** has determined that PSAR Section ___ of the **Barakah Units 1 and 2** construction licence application has been appropriately completed as Category 2 and that the **KINS** SER review of the reference plant forms a sufficient basis for **FANR** to determine the acceptability of **Barakah Units 1 and 2** in the **UAE**.

X.X.Z.5	**Open items**

The **FANR** staff reviewed PSAR Section ___ of the **Barakah Units 1 and 2** construction licence application, subsequent application material, and the **KINS** SER Section ___ for **Shin-Kori Units 3 and 4** related to (topic of review).

Upon satisfactory resolution of the Open Items provided in SER Section X.X.Z.7 below, the **FANR** staff can determine that **KINS** regulatory requirements associated with this area of review are consistent with those of **FANR** and that the technical basis for the **KINS** SER review and evaluation of this area is clearly described and acceptable to **FANR**. In addition, **FANR** can determine that the application does not identify any plant design changes or operational changes that have significant impact on nuclear safety.

X.X.Z.7	**Open items**

The following Open Items must be satisfactorily addressed prior to issuance of the construction licence.

[PROVIDE INPUT]

OR

There are no Open Items to be addressed prior to issuance of the construction licence.

Appendix 1 to SER Section X.X.Z
Reason for additional information status

Provided a complete listing of the requests for additional information (RAIs) and their status for this section of the SER.

RAI #	RAI subject	Status	ENEC action	Due date/event

OR

There were no RAIs for this section of the SER.

Appendix III.
Template for request for information

The following template is provided to support consistent documentation of requests from Recipient Regulators to Source Regulators, as well as the correspondence to the requests for information (RFIs) on regulatory assessments to facilitate the sharing and leveraging of information between regulatory bodies.

Reactor design name – Regulatory assessment Recipient Regulator Name, Step	Date
Request for information (RFI) [RFI to Source Regulator]	
RFI number [Chapter/section-sequential number]	
RFI originator	Recipient Regulator
GAP chapter / Section	Date sent to Source Regulator
RFI topic	
Enter a description of the information or clarification requested from Source Regulator	

Source Regulator response to RFI:

Source Regulator reference document	Date

References

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Collaborative Reviews and Effective Leveraging – The IAEA's Nuclear Harmonization and Standardization Initiative, VIEA TECDOC 2000, IAEA, Vienna (2020), https://doi.org/10.61092/iaea.pvq-fh3

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Information Sharing Framework for Regulatory Reviews of Advanced Reactors – The IAEA's Nuclear Harmonization and Standardization Initiative, VIEA TECDOC 2105, IAEA, Vienna (2023), https://doi.org/10.61092/iaea.rqa-ewm

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Regulatory Cooperation Toolkit: Resources for Leveraging Regulatory Reviews – The IAEA's Nuclear Harmonization and Standardization Initiative, IAEA, Vienna (2024)

[4] UNITED STATES NUCLEAR REGULATORY COMMISSION, CANADIAN NUCLEAR SAFETY COMMISSION, UNITED KINGDOM OFFICE FOR NUCLEAR REGULATION, Memorandum of Understanding Between the United States Nuclear Regulatory Commission, the Canadian Nuclear Safety Commission, the United Kingdom Nuclear Regulatory Commission, the Canadian Nuclear Safety Commission and the United Kingdom Office for Nuclear Regulation, U.S. NRC, CNSC, and ONR, Rockville (2024)

[5] OFFICE FOR NUCLEAR REGULATION, Leveraging Guide, ONR-GDA-GD-008, ONR, Bootle (2025), https://www.onr.org.uk/operative-design-assessment/assessment-of-reactors/grp-serious-reactors-tsm-2002

[6] OFFICE FOR NUCLEAR REGULATION, Generic Design Assessment of the BWRX-300 – Step 2 Assessment of Fault Studies and Severe Accident Analyses, UK ONR, Bootle (2025)

[7] OFFICE FOR NUCLEAR REGULATION, ONR GUIDE – Design Basis Analysis, UK ONR, Bootle (2022)