18. Fuel Assembly hydraulic design report

The report describes overview and description of the Fuel Assembly thermal-hydraulic design evaluation and its results for Fuel Assembly hydraulic design bases [redacted]

19. Core thermal hydraulic design report

The report describes overview and description of the core thermal design evaluation and its results for core thermal design bases [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

23. Preliminary Core Design report

The report describes overview and description of the First Core Design evaluation and its results for all Core Design criteria established and presented in the Appendix C based on enrichments assumed in the Nuclear Fuel Design. [redacted]

[redacted]

24. Final Core (Nuclear) Design report

The report describes overview and description of the First Core Design evaluation and its results for all Core Design criteria established and presented in the Appendix C based on the final core design.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

27. Safety evaluation report for the first cycle

According to the Core Design safety evaluation methodology report, this report will contain all results of Nuclear Design, Thermal-Hydraulic Design and Fuel Rod Design obtained within the framework of elaboration of First Core Design, which are compared with the design limits [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

29. First Core CSMS [redacted] input data delivery (document + electronic files)

The Supplier will provide to the Owner the electronic files including installation and testing report, which includes all needed input data used in Monitoring and Protection System, which are necessary for Monitoring and Protection System performance [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

32. Start-up tests predicted data report

The Start-up tests predicted data report will contain all relevant calculated final data, which are related to the Start-up and are necessary for confirmation of design criteria.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

37. Computer Codes abstracts and validation reports

38. Computer Code manuals

[redacted]

[redacted]

[redacted]

43. Quality management system, quality management related manufacturing and transportation report

Quality Management System is part of Implementation Program therefore, the schedules and deliverables are listed in Appendix P. In provision of Quality Management System, manufacturing and transportation related quality management program will be provided [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

48. Instructions, rules and constraints for Fuel Assembly and Core Components handling, inspection, operation and storage

The Supplier will provide all reports, where instructions, rules and constraints for Fuel Assembly and Core Components handling, inspection and storage are treated. [redacted]

49. Instruction, rules and constraints for transport container handling, inspection and storage

The Supplier will provide all reports regarding instruction, rules and constraints for transport container handling inspection and storage. [redacted]

50. Post Irradiation Inspection Program and repair document

Based on NFC Appendix O, the Supplier will elaborate in more detail scope of the PIIP to be performed at the Plant. [redacted]

[redacted]

[redacted]

52. Project management documentation

The Supplier will provide set of documents related to organization and management of the NFC project according to its description in NFC Appendix Q. Project management plan will describe description and structure of proposed control and reporting of the Project.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

60. Audits results documentation

Report will document results of the technical or quality management audits and resolution of all filed issues and/or identifications – [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

72. Final Core (Nuclear) design report

[redacted]

73. Reload Safety Evaluation report

According to the Core Design safety evaluation methodology report this report will contain all results [redacted]

Content of the report expected to be analogical to the First Core.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

79. CSMS [redacted] input data delivery

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

82. PIIP and fuel operation results evaluation report

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

87. Fuel and Core related cycle specific changes to Technical Specification (if any for specific reload)

In the case, when some parts of Plant Technical Specifications (Core operating limits and conditions) must be modified for next Cycle as result of Core Design process.

[redacted]

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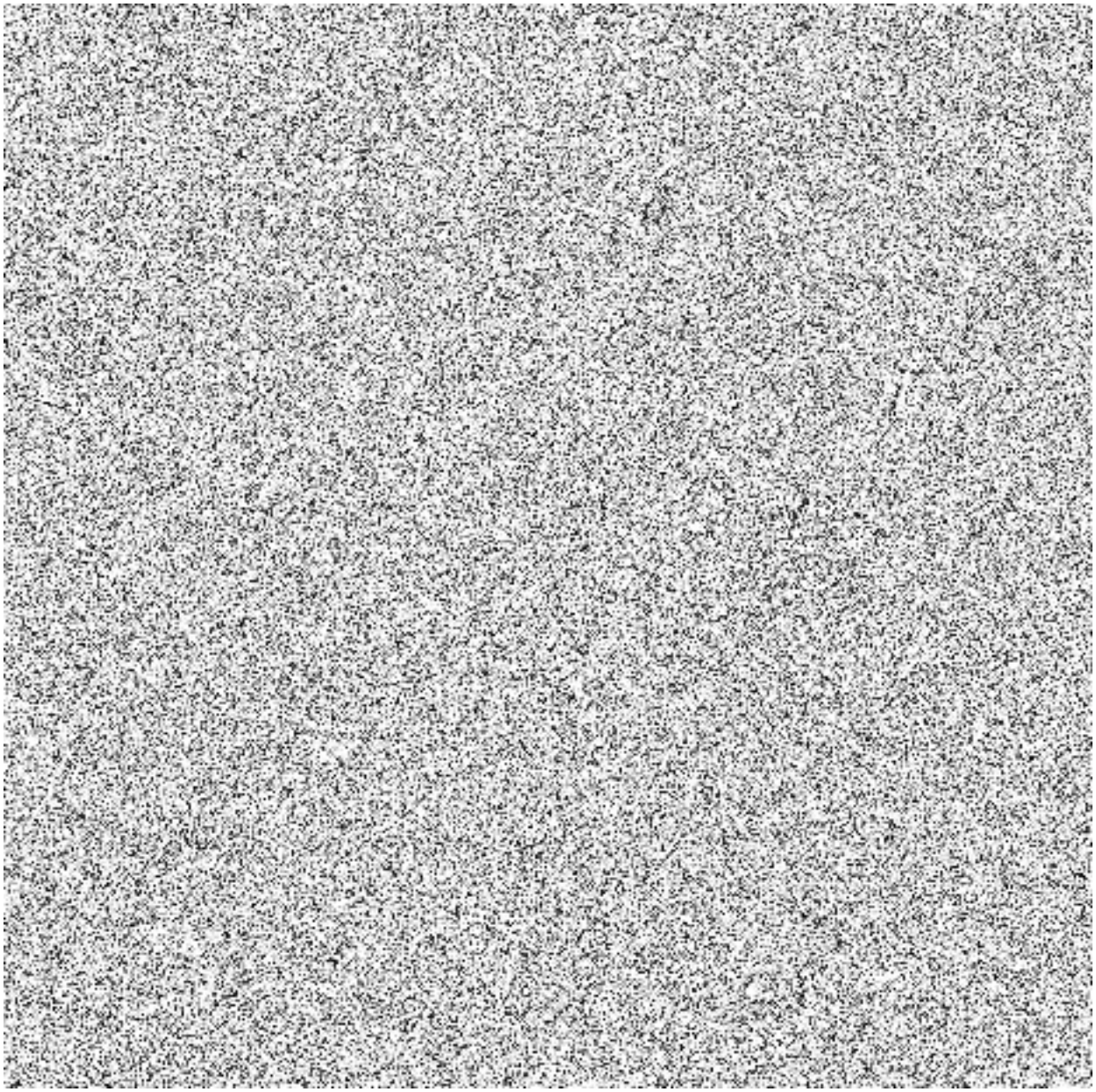
[redacted]



NUCLEAR FUEL CONTRACT

APPENDIX F

DOCUMENT NAME:	NUCLEAR FUEL CONTRACT APPENDIX F

F - LICENSING PROGRAM

F.1 GENERAL PRINCIPLES

The Supplier shall be responsible for ensuring that the Plant together with the Nuclear Fuel and Core Components is fully licensable and permissible in the Czech Republic.

The licensing plan for Nuclear Fuel Contract shall follow the Project Adaptation Plan in the EPC Contract. The Project Adaptation Plan (PAP) will be developed further, if necessary, to provide KHNP's preparedness for Licensing and Permitting activities for Dukovany Unit 5&6 which will be used as one of the inputs for Licensing and Permitting Plan that is to be prepared by the Owner with the support of the Supplier during the Project.

The PAP describes the methods of the KHNP's project adaptation to comply with the Rules of the Czech Republic, a manner of KHNP's support to the Owner during the development of the Licensing and Permitting documents and Licensing and Permitting activities, and proposed Licensing and Permitting process in the Czech Republic. For NFC, the licensing plan is based on requirements of NFC Chapter 6 and NFC Codes and Standards listed in Appendix G.

As required in NFC Article 6.1.1 and 6.1.2, all NFC work including the Standard Design of Reference Plant shall comply with regulations in Czech Republic and in country of origin. And the Supplier and the Owner shall obtain all required license with own responsibility.

The detailed licensing plan shall be provided in attached documents. Since licensing of NFC work must be accompanied with all parts of EPC contract, Licensing plan has been developed to reflect the whole procedure of plant construction and operation. The Licensing program of NFC shall include all details in Licensing plan established with EPC Contract and other information for licensing of NFC work.

NFC Appendix F also complies with Implementation Plan in Appendix P. The deliverables and their relative schedules can be found in Appendix E and R respectively.

F.2 LICENSING PROGRAM SCOPE

F.2.1 SCOPE OF LICENSING PROGRAM

PAP describes how the full licensability and permissibility of APR1000 including Fuel System and Core are assured in the Project. With basic description of Licensing and Permitting process in the Czech Republic, approaches to ensure licensability and permissibility including the KHNP's organization for support of Licensing and Permitting are also provided.

It describes how the Plant will be adapted to the Rules of Czech Republic including approaches to comply with the five different levels of the Rules.

It also describes the manner of support which will be provided by KHNP during the development of the Owner's preparation of Licensing and Permitting Documents. Specifically, how the source Documents for the Licensing and Permitting Documents are prepared and handed over and how the access of the Owner to the coordinated project engineering data model of the Basic Design and Detail Design is assured.

Finally, it describes the manner of support provided by KHNP to the Owner and communication with the Owner during the Licensing and Permitting process in the Czech Republic including during the negotiations with the Authorities.

F.2.2 LICENSABILITY AND PERMISSIBILITY

There are two types of the Licensing and Permitting processes related to the Nuclear installation in Czech Republic. The first one is a Licensing process such as Construction License, First Physical Start-up License, First Power Generation Start-up License and Operation License according to the Atomic Law and the other one is a Building Permitting process with Building Act. In order for the Owner to obtain the both License and Permitting.

Description of Licensing and Permitting Process

KHNP will provide necessary support to the Owner for each stage of licensing as follows:

[redacted]

F.2.3 MANNER OF SUPPORT DURING DEVELOPMENT OF LICENSING AND PERMITTING DOCUMENTS

This section describes the schedule for submission of the source documents prepared by the Supplier along with the associated Licensing and Permitting process for each license or permitting phase.

[redacted]

Documents for Construction License and Building Permit

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Licensing Document

- Management system programme

[redacted]

- Limits and conditions

[redacted]

[redacted]

- Programme of controls for the Construction phase

[redacted]

- Preliminary safety report

[redacted]

- Programme of construction of the nuclear installation, including the timetable

[redacted]

- Preliminary commissioning plan for the nuclear installation

[redacted]

[redacted]

- The method of quality assurance

[redacted]

[redacted]

Document for First Physical Start-up License

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Document for First Power Generation Start-up License

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Document for Operation License

[redacted]

[redacted]

[redacted]

[redacted]

Preparation of Source Documents

The Supplier supports the Owner's licensing works and in order to incorporate those requirements the Supplier is necessary to prepare and submit source documents to the Owner as stipulated in the following:

- The NFC Supplier shall provide the license related documents listed in NFC Appendix E including preparation of Safety Analysis Report (SAR)

The source documents for the preparation of Owner's Licensing and Permitting documents, the configuration management for the source document and the brief introduction of the configuration management for design process are as below:

[redacted]

Figure F.2.1 Diagram relation Project and Operational CM

Cooperation between the Supplier and the Owner during Documents Elaboration

Details of Cooperation Field

The Supplier is responsible for the following activities:

[redacted]

[redacted]

KHNP will prepare the source documents for the preparation of Owner's Licensing and Permitting Documents by matching KHNP's documentation practice into the project documents. KHNP will provide all proven technical documents for plant proveness requested by the Owner in an appropriate and timely manner. [redacted]

F.2.4 MANNER OF SUPPORT AND COMMUNICATION

Process of the Licensing and permitting Support

The proposed Licensing and Permitting process of the Project is schematically described in Figure F.2.5. This process is proposed to provide supports for Licensing and Permitting to the Owner for preparation and revision of Licensing and Permitting Documents. Each element of processes is explained below and applies to the Owner, the Supplier and/or its Subcontractors. KHNP and its Subcontractors will support the Owner to obtain the all License and Permit of Dukovany Unit 5&6 Project through the process described in this section.

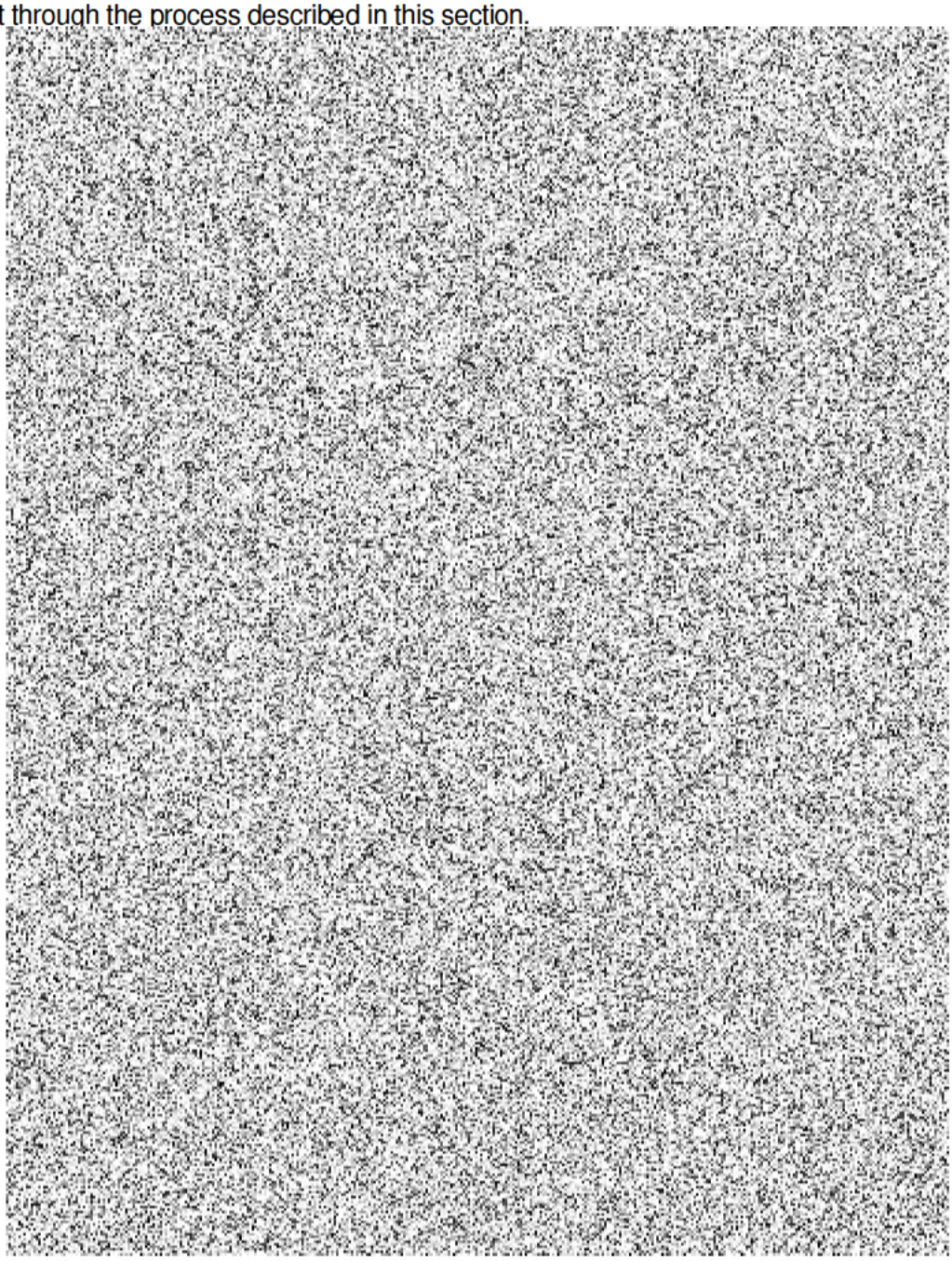


Figure F.2.2 Process for Preparation and Revision of Licensing Documents

Preparation of Source Documents

For Owner's preparation of Licensing and Permitting Documents, KHNP shall prepare source documents in compliance with Atomic Act, Building Act and the relevant decrees of the Czech Republic. When the source documents is complete, the preparing entity will forward the source documents to the Supplier. The Supplier shall submit the reviewed and coordinated source documents to the Owner.

Preparation and Submission of Licensing and permitting Documents

The Owner prepares Licensing and Permitting documents for each license and permitting application by using the source documents provided by the Supplier. During the preparation of the Licensing and Permitting documents, the Owner may request the Supplier to review the Licensing and Permitting documents. When the request is received, KHNP shall assign the documents related Subcontractor.

Subcontractor received the documents shall review the documents and provide the answer to the Supplier. The KHNP shall integrate and manage all received documents by the Subcontractor. After that, KHNP will submit integrated answer to the Owner through configuration management system. The Owner is expected to incorporate the final comments into the Licensing and Permitting documents.

When the preparation of the Licensing and Permitting documents is complete, the Owner will submit them to SUJB and/or other Authorities for each Licensing and Permitting application and distribute them to the Supplier and Subcontractors.

RAI Responses Process

Revision of Licensing and permitting Documents

On completion of the regulatory review of SUJB and/or other Authorities, the Owner shall issue Licensing and permitting Document revisions. Generally, the document revision is to support the initial and final SUJB and/or other Authorities review, or after the issue of a Licensing and Permitting.

The revision would reflect the latest Licensing documents approved by SUJB and/or other Authorities. Revisions are indicated by the use of sequential revision numbers.

Approach for Communication with the Owner

KHNP will establish, implement and control Communication Management Plan governing correspondence and written information flow between the entities during the whole Project period.

Communication Management Plan

KHNP will operate centralized communications center where all official correspondences for the Project are to be handled. Figure F.2.6 shows configuration of KHNP communication management.

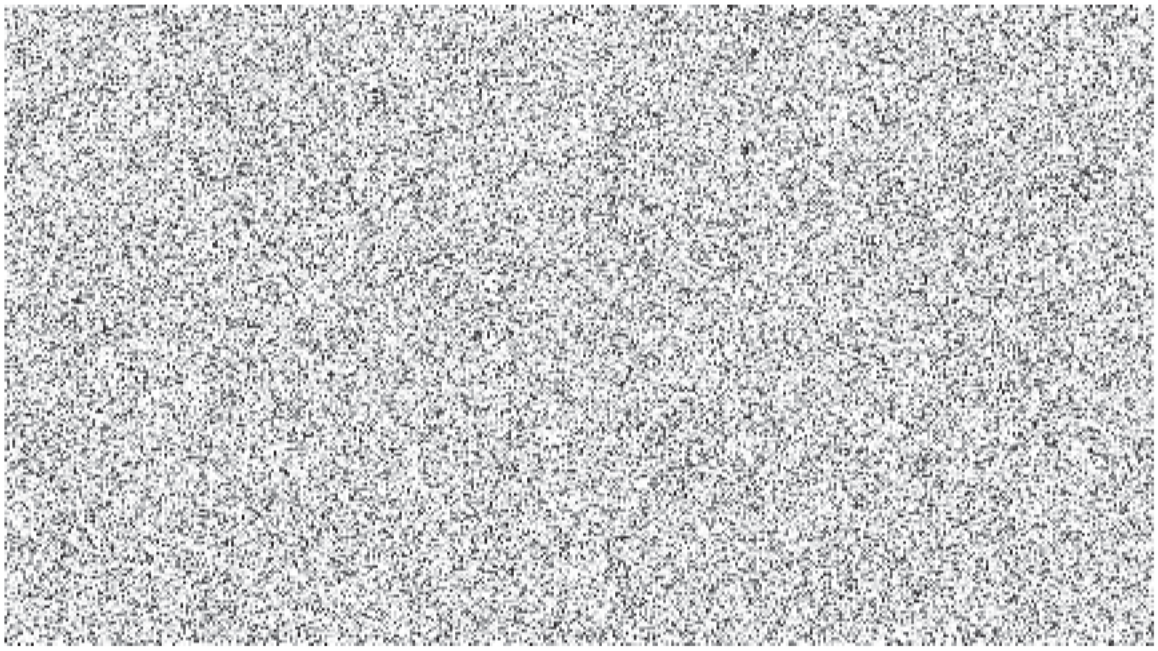


Figure F.2.6 Configuration Communication Management Organization

Communication among the Entities

In order to facilitate the flow of project information exchange between KHNP and subcontractor, KHNP and Subcontractor will always utilize Configuration Management systems during the development of the Licensing and Permitting Documents created from Licensing and Permitting activities. Then the final decision will be provided to the Owner through KHNP. This, Escalation Procedure, can help the Owner to reduce the decision-making time when any technical issue is happened. This organization allows the Owner to communicate more efficiently with SUJB or other regulatory authorities.

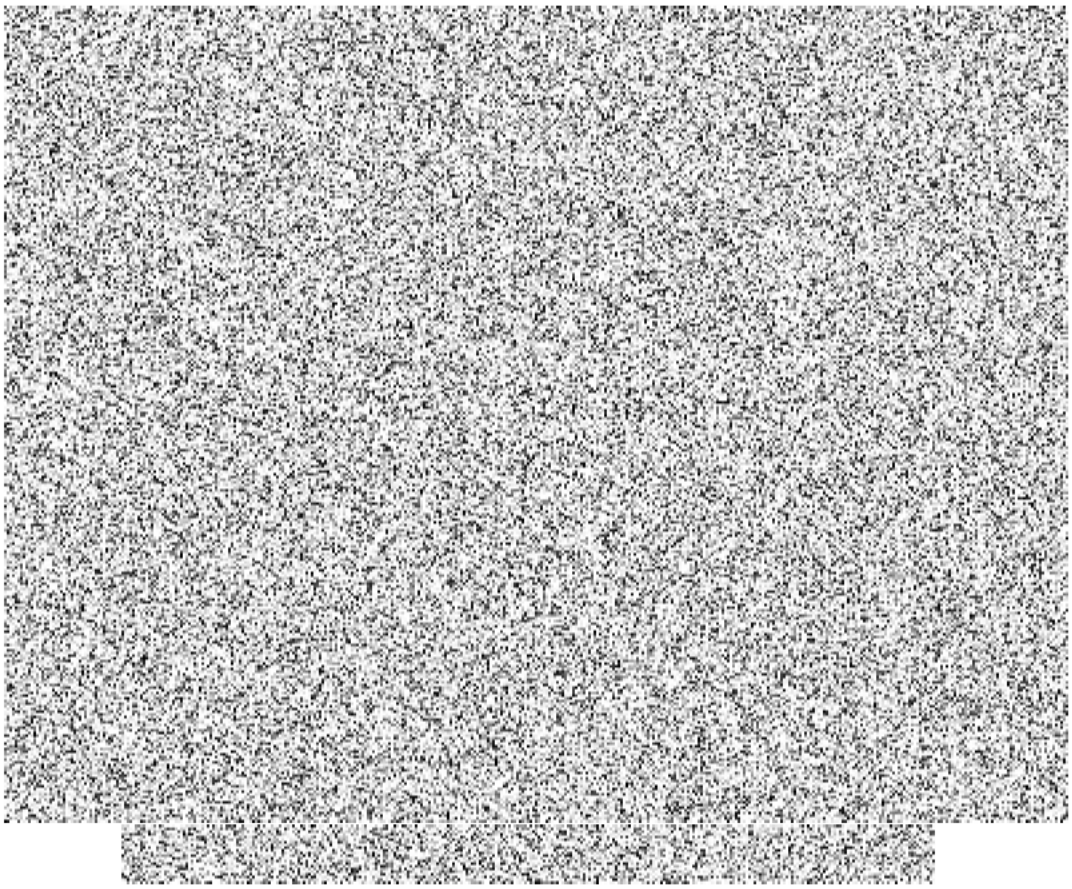
Communication between the Owner and KHNP

KHNP will communicate with the Owner through meetings and correspondence as described in next Section. All project information will be transferred to the Owner by KHNP as an EPC Contract and NFC Contractor.

Tools for Support and Communication

KHNP will establish diverse tools optimized for communication and information access for the Dukovany Unit 5&6 Project. Such communication tools will be subdivided and operated with consideration for the nature, importance and urgency of communication and information.

Information Sharing System



Design and Project Meeting

The entities will periodically at specified intervals conduct meetings in order to exchange the Project information. During the design process phase, meetings on the review and feedback of the state of design progress will be held.

The classification and guidelines of meetings at the design phase are as follows:

- Design progress meetings

  The design progress meetings are held to review and evaluate the status and progress of design. The Owner, Contractors and their Subcontractors will participate in this meeting. The Owner will chair the meeting.

- Technical meetings

  The technical meetings are held to identify technical problem and establish plans for potential corrective actions. The Owner, Contractors and their Subcontractors will participate in this meeting. The Owner will chair the meeting.

- Interface meetings

  The interface meetings are periodically held to report on the status of A/E-NSSS and A/E-T/G interface issues, identify problems as they arise, and promptly resolve problems and disputes in order to minimize adverse impact on the Project

- Licensing meetings

  The licensing meetings are held to identify problems related to licensing and promptly resolve problems and disputes in order to minimize adverse impact on the Project

- Review and approval of the KHNP's submittals meetings

  The review and approval of the KHNP's submittals meetings are held to resolve problems related to the KHNP's submittals.

- 3-Party Review Meeting for Preparation of Safety Analysis Report

  This meeting will be held to finalize the SAR based on the draft. Representatives from the entities responsible for SAR preparation and review will attend this meeting. Each entity will review and provide the amendment for SAR if necessary. Items that cannot be resolved during the meeting will be controlled as action items. The responsible entity for the action items will resolve them within the due date decided in the meeting.

Separately, various project meetings will also be established and operated to manage Dukovany Unit 5&6 Project successfully.

Meeting notes are kept to record the proceedings of formal meetings involving project personnel. These notes will include all significant points of discussion, agreements, action items and decisions reached during the meeting. In principle, the notes will be signed and issued to the participants of the meeting and distributed directly to the participants after the meeting, and the notes will be officially transmitted by the memorandum within a few days of the issuance of the notes.

The meeting procedures, definition, sequence and time intervals will be agreed by the Parties and specified in the Design Manual.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

F.3 LICENSING PROGRAM ORGANIZATION

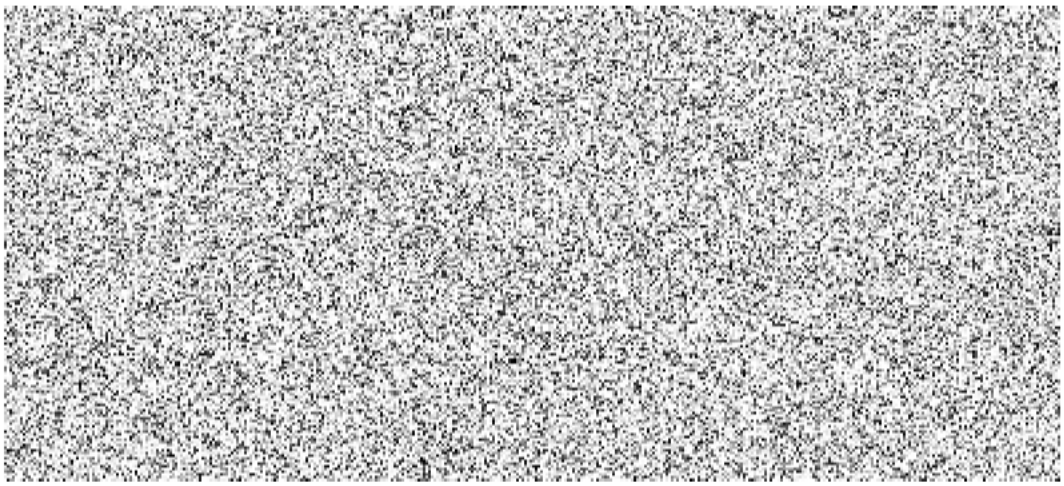


Figure F.3.1 Support Organization for Licensing and Permitting

Figure F.3.1 shows the organization of KHNP and its Subcontractors to support the Owner's Licensing and Permitting activities. KHNP will manage the whole Project in an integrated way and directly communicate with the Owner. The project organization of KHNP and its Subcontractors will effectively communicate and share the information of the Project in accordance with the pre-established Project Procedures Manual (PPM) and the strong partnership accumulated in the numerous domestic NPP construction project.

Organization of KHNP Head Office

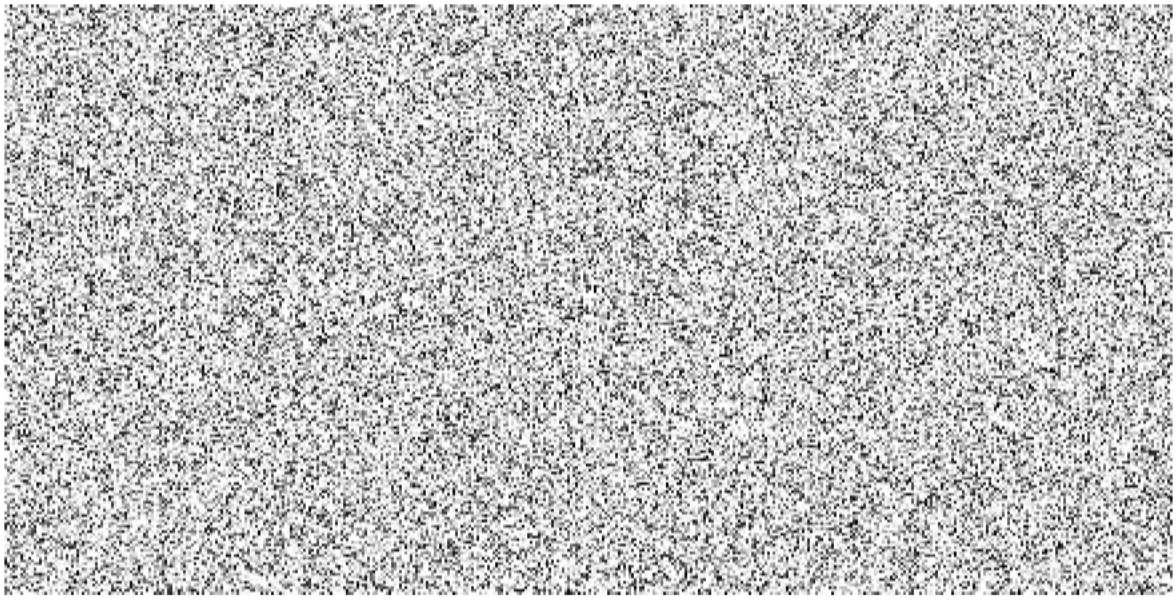


Figure F.3.2 Organization for Licensing and Permitting in both KHNP and its Subcontractor

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Organization for Czech Site

[redacted]

Table F.3.1 The Comparison between KHNP's Practical Construction Phase and Czech Republic

[redacted]

[redacted]

LWA Phase

[redacted]

FNTP Phase

[redacted]

[redacted]

NUCLEAR FUEL CONTRACT

APPENDIX G

DOCUMENT NAME:	NUCLEAR FUEL CONTRACT APPENDIX G

G - MANDATORY LAW AND NFC CODES AND STANDARDS

Appendix G identifies the Mandatory Law and the NFC Codes and Standards (Levels I-IV) which are applicable to the NFC Work. A non-exhaustive list of applicable Mandatory Law is referred to in Part G.1 of this Appendix G. Applicable NFC Codes and Standards are structured in 4 levels, listed in Parts G.2 to G.5 of this Appendix G (i.e., Level I NFC Codes and Standards listed in Part G.2, Level II NFC Codes and Standards listed in Part G.3, Level III NFC Codes and Standards listed in Part G.4 and Level IV NFC Codes and Standards listed in Part G.5).

As follows from Article 2.1.8.1 of the NFC, the Mandatory Law shall have priority over the NFC Codes and Standards. The hierarchy of the NFC Codes and Standards corresponds to the importance of the levels with the level of importance [redacted]

G.1 MANDATORY LAW

G.1.1 International Conventions, treaties and legally binding EU documents being part of Mandatory Law

A non-exhaustive list of the relevant documents is provided in the EPC Contract, Technical Requirements Document, Sections 2.5.3.2.1 and 2.5.3.2.2.

G.1.2 Acts, Decrees and Governmental Orders being part of Mandatory Law

A non-exhaustive list of the relevant documents is provided in the EPC Contract, Technical Requirements Document, Section 2.5.3.2.3.

G.2 LEVEL I NFC CODES AND STANDARDS

Level I NFC Codes and Standards are specified in parts G.2.1 to G.2.3 below.

G.2.1 IAEA safety fundamentals and safety requirements

[redacted]

G.2.2 WENRA safety requirements

[redacted]

G.2.3 Quality management and environmental requirements

[redacted]

[redacted]

G.3 LEVEL II NFC CODES AND STANDARDS

Level II NFC Codes and Standards are specified in parts G.3.1 to G.3.3 below.

G.3.1 Nuclear safety codes and standards used during licensing process of the Reference Plant and Standard Design

NFC Codes and Standards used during licensing process of the fuel for the Reference Plant and Standard Design are specified in the table below and include the following categories (and will be used for the Project):

[redacted]

[redacted]

[redacted]

G.3.2 Czech State Office for Nuclear Safety's regulatory guides

[redacted]

G.3.3 IAEA Safety Guides and ISO Guides

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

G.4 LEVEL III NFC CODES AND STANDARDS

Level III NFC Codes and Standards are specified in this part G.4 below:

G.5 LEVEL IV NFC CODES AND STANDARDS

Level IV NFC Codes and Standards are specified as follows:

[redacted]

[redacted]

NUCLEAR FUEL CONTRACT

APPENDIX H

DOCUMENT NAME:	NUCLEAR FUEL CONTRACT APPENDIX H

H - PROVISION OF MEANS OF FUEL MANAGEMENT

H.1 PURPOSE

The purpose of the provision of the means, associated Computer Codes, technologies and methodologies and other related information and services (further denoted as “Means of Fuel Management”) is to create conditions allowing Owner to perform independently of the Supplier the Reload Core Design, including Nuclear Design, thermal-hydraulic design and Fuel Rod design, enabling the Owner to define all customized Fuel Assembly parameters for specific Core reload, Core Design safety evaluation and Core surveillance and monitoring system (CSMS) model development.

In addition, provision of Means of Fuel Management shall enable Owner to perform independently of the Supplier other activities related to the responsibilities of reactor engineers including, but not limited to Fuel tracking, manipulation, surveillance, post-irradiation inspection (PIIP) execution and evaluation, accounting of nuclear materials and cycle specific input data preparation.

In addition, provision of Means of Fuel Management shall enable Owner to perform independently of the Supplier the physics start-up testing, to operate the Core and to evaluate the Core operation data.

Owner shall be able to perform such activities in compliance with licensed safety standards and methods applying Supplier’s latest commercially used technologies. The specific requirements related to Reload Core Design portion of the Means of Fuel Management are described in the Part H.4.

Provision of Means of Fuel Management shall in general include the supply of a computers and other hardware, software, methods, and methodologies, including their licenses, and all related information/documentation, services and associated training, as specified in the following paragraphs, allowing the Owner to independently operate provided Computer Codes, to utilize technologies and methods.

H.2 COMPUTER CODES AND TECHNOLOGIES SCOPE

The Provision of Means of Fuel Management shall include Computer Codes, technologies, methodologies, and methods, including relevant Intellectual Properties, for:

[redacted]

Provision of Means of Fuel Management shall include also technologies and methods related to Core control strategies and tools for surveillance of specific core parameters. Core surveillance tools (CSMS) are not included in the scope of supply of the Nuclear Fuel Contract but are included in the Scope of Supply Document of the EPC Contract. However, the relevant reactor physics related methods, topical reports documentation and operating procedures are included in the Means of Fuel Management scope of supply. The Means of Fuel Management supplies shall assure consistency between Core design and Core surveillance methods and operating procedures.

[redacted]

H.3 GENERAL DESCRIPTION

Appendix H includes general description for computer codes and methodologies provided by NFC. Following information is provided for each computer codes when it is applicable.

- List of all Computer Codes (i.e. base computer codes, supplementary codes, pre-processors, post-processors, tools, database applications etc.) included in the scope of the Means of Fuel Management – The list of Computer Codes is summarized in Tables H.3.1 and H.3.2
- List of Computer Codes by their category is described in Table H.3.3
- List of relevant documentation is in Part H.6
- Presentation of the guaranteed calculational uncertainties for all parameters limited in the reload Core Design and safety evaluation is described in Appendix C. The bias and uncertainty will be evaluated and applied in core design
- Information about the level of automation of the specific steps of the Reload Core Design and safety evaluation process, and if applicable, also in other parts of Fuel management
- Expected hardware and software architecture is in part H.8
- Means of Fuel Management implementation at Plant site for operation supporting codes,
- Basic conditions of the plan to upgrade Computer Codes and methods
- Computer Codes and methods quality management during their development and after their implementation at Plant site (upgrades)

Table H.3.1 List of Computer Codes

Table H.3.2 List of Operation Supporting Code

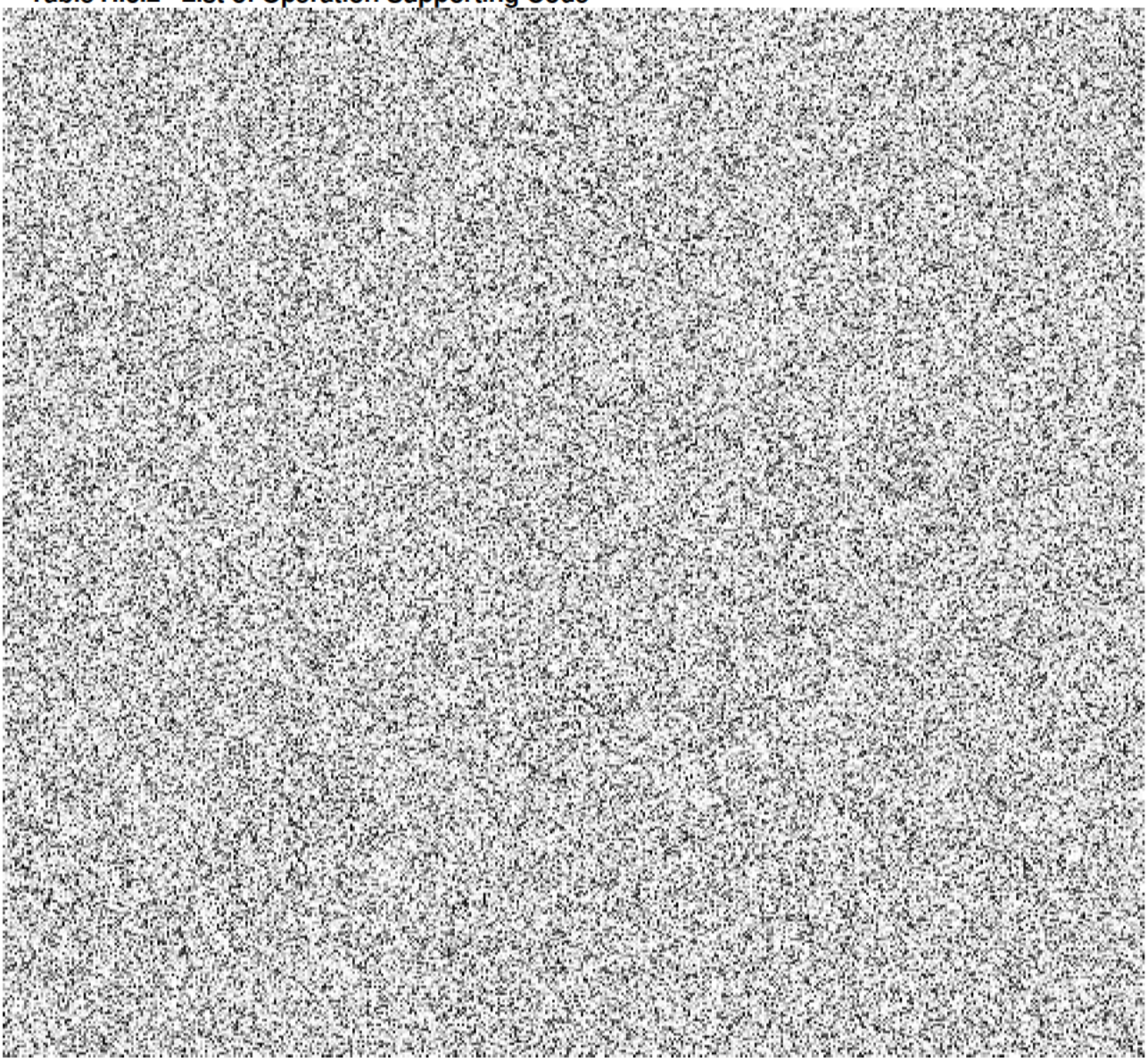
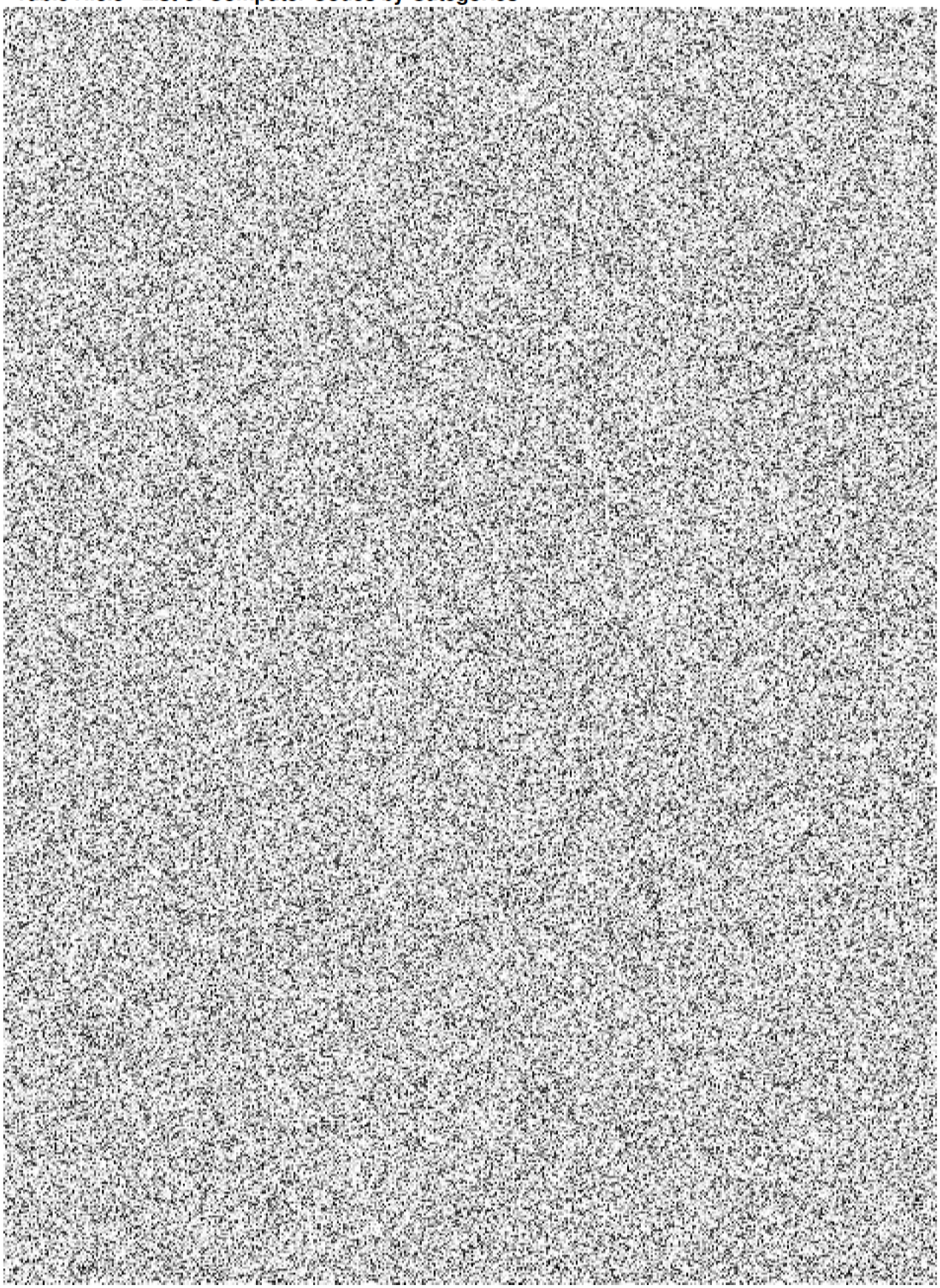


Table H.3.3 List of Computer Codes by Categories



[redacted]

The detailed information for description is provided in each part of Appendix H.

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H.4 RELOAD CORE DESIGN AND SAFETY EVALUATION

The package of Computer Codes and technologies for Reload Core Design shall include analytical tools and methods for Core Design in the following disciplines: multi-cycle in-core fuel management, nuclear fuel design and in-core fuel management usually denoted as “Nuclear Design”, thermal-hydraulic usually denoted as “T/H Design”, fuel thermo-mechanic usually denoted as “Fuel Rod Design” including safety evaluation analysis in each discipline. Together they shall cover (as further denoted) the “Reload Core Design and safety evaluation” process in the frame of Supplier’s licensed methodologies. The package shall include also Computer Codes and technologies enabling evaluation and resolution of non-standard but yet expectable deviations from the standard Core Design process performed on a reload design basis.

This part of the Means of Fuel Management package shall be capable of development of low leakage loading patterns, loading patterns with high Burn-up fuel and flexible Fuel Cycle lengths.

The package shall maximize automation and minimize manual data processing required by individual Computer Codes.

The accuracy of these Computer Codes should equal or exceed the state of the art accuracy of such computer codes prevalent in the industry at the time of the delivery of these Computer Codes.

Major procedure of initial Core Design is shown in Figure H.4.1 in brief and is summarized as follows:

A. Preliminary Loading Pattern Determination

[redacted]

[redacted]

[redacted]

B. Nuclear Design Data Generation for Other Design Fields

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

C. SAR Preparation and Licensing Support

[redacted]

[redacted]

[redacted]

[redacted]

D. Generation of Operation Support Data

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

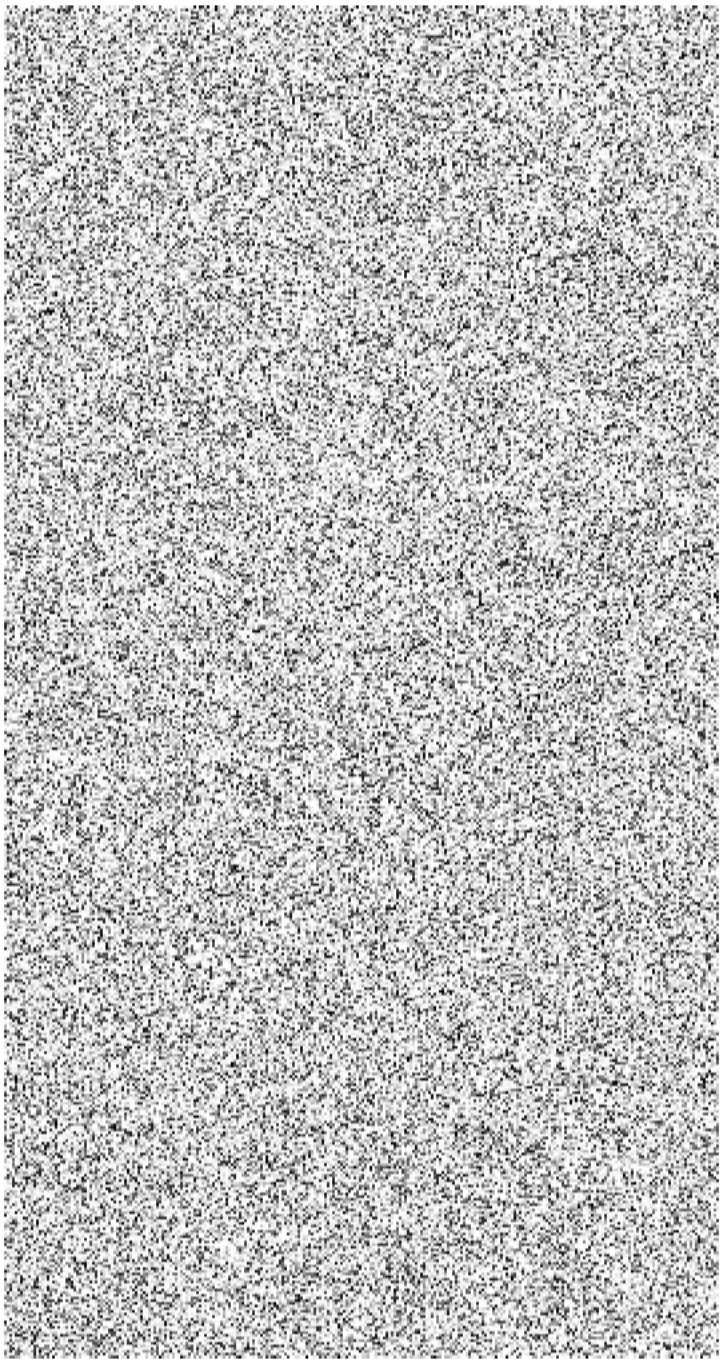

Figure H.4.1 Major Design Procedure for Initial Core

For Reload Core Design shown in Figure H.4.2, following design field category and work branches are required:

A. Preliminary Loading Pattern Determination

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

B. Safety Analysis and Evaluation

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

C. Fuel Management Scheme

[redacted]

[redacted]

[redacted]

D. Final Loading Pattern Determination

[redacted]

E. Generation of Operation Support Data

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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F. NDR Generation

[redacted]

[redacted]

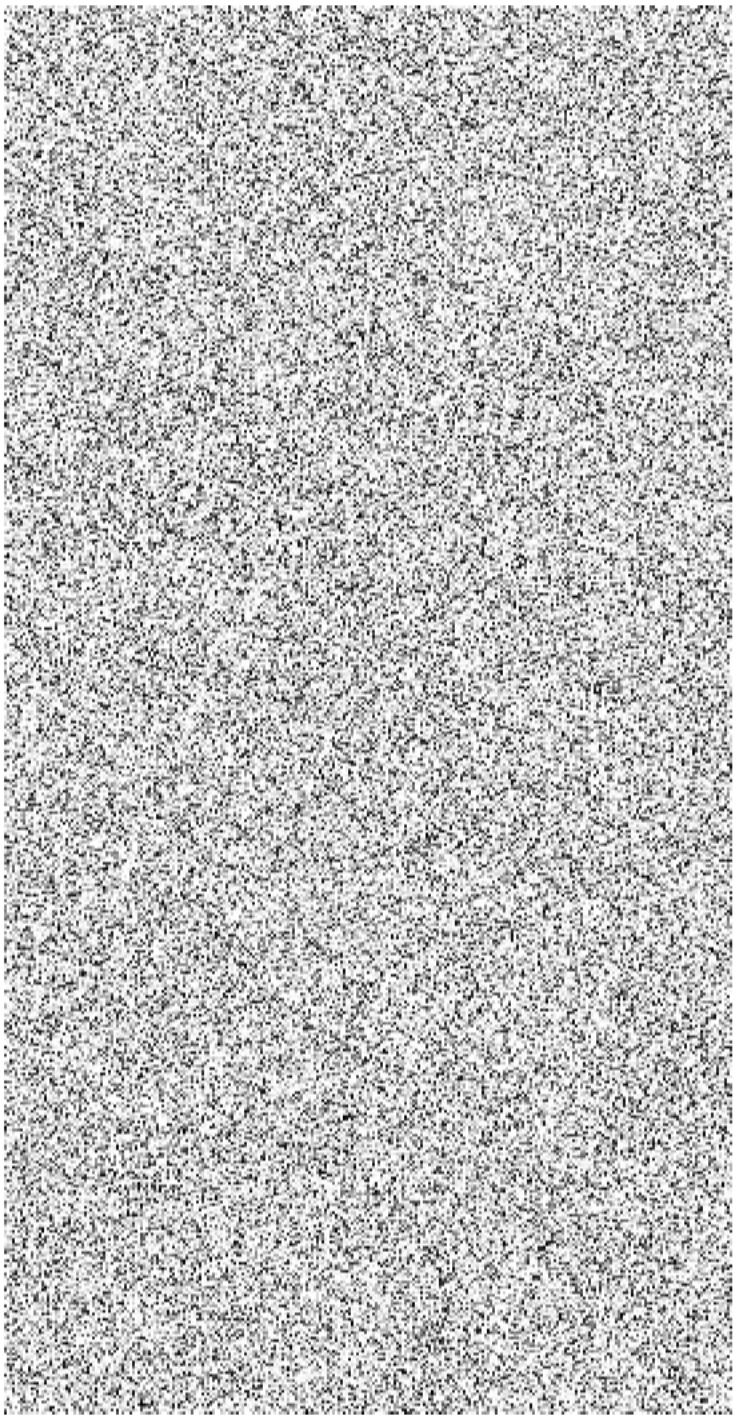


Figure H.4.2 Major Nuclear Design Procedure for Reload Core

[redacted]

[redacted]

H.5 SCHEDULING

The provision of the Means of Fuel Management is scheduled in Appendix R to occur such that the Owner is trained, within the scope of the Means of Fuel management, to perform independent review and interpretation of the delivered design documentation and independent recalculation and evaluation of the First Core Design before a licensing application is submitted to Authorities.

All Means of Fuel Management will be provided to Owner for proper review and approval process. Also, they will be incorporated with adequate training to perform independent review of the Supplier's work which are described in Appendix J. The schedules are designed in such principle and explained in Appendix R.

The Means of Fuel Management includes the provision and training of operation supporting codes. The provision and training shall follow the same schedule with the design codes. The installation of operation supporting codes can be only performed after the preparation of related hardware.

H.6 DOCUMENTATION

The list in Appendix E of the documentation related to Means of Fuel Management are described in this part.

The documentation shall include:

[redacted]

Validation and verification documentation, engineering analyses and quality management records shall be available to Owner at the respective Supplier's facility.

[redacted]

All documentation shall be treated in controlled copies pursuant to Quality Management System and shall be in English, as specified in Appendix E.

H.7 FIRST IMPLEMENTATION AND UPDATES

The Supplier is responsible for software and hardware installation at the Plant site, methodology delivery and relevant training and maintenance in accordance with the conditions presented in the NFC Article 2.2.4.

The first implementation as a Supplier responsible part of the Means of Fuel Management shall be initially performed by the Supplier soon after the effective date of NFC. It is including hardware and software installation (load, test and execute).

The Supplier's procedure for the software quality assurance and software configuration management is based on the ASME NQA-1 that is an industry standard maintained by ASME and endorsed by the NRC is applied for the Supplier's Reload Core Design Computer Code development and upgrades. In accordance with the procedure for development, issue handling and configuration management, the Supplier shall assure the compatibility of the entire package.

H.8 HARDWARE PLATFORMS ARCHITECTURE

In general, hardware platforms should host all Computer Codes and applications which are the subject of Appendix H; however, there may be exceptions. Under the approval of system environment, all Computer Codes shall be operated properly as it has not been reported any deviation in Supplier's system. However, any unproper operation will be reported and examined in agreement of both parties.

The final computer system architecture shall support secured connections with Owner Information Management System (OIMS) and shall be sized for the entire reactor physics department for Plant. Hardware platforms shall assure trouble-free software functioning and enable future software upgrades and maintenance.

The initial computer system architecture is described as following;

The hardware architecture includes following requirements:

Hardware maintenance includes following requirements:

Hardware and Software specification is subject to change depending on the development of relevant technology and market condition.

H.9 SHARING OF EXPERIENCE

User's group meeting has been held and will be continued annually to share experience of use and development. Each design field will have their own meeting hosted by development group.

Software issues are handled by issue tracking process which consists of issue identification, issue verification, software change, and issue closure. If software issues occur, the external customer who finds software issue notifies customer support manager of software issue material and then, relevant staff identifies the issue.

[redacted]

[redacted]

[redacted]

NUCLEAR FUEL CONTRACT

APPENDIX I

DOCUMENT NAME:	NUCLEAR FUEL CONTRACT APPENDIX I

I – SPECIFIC RIGHTS AND OBLIGATIONS RELATING TO MEANS OF FUEL MANAGEMENT

This Appendix I of the NFC governs certain rights and obligations of the Parties relating to the Computer Codes, Configuration Data, Documentation and Source Codes to be provided by the Supplier to the Owner as part of the Means of Fuel Management in accordance with Article 2.2.4 of the NFC, Appendix H of the NFC and other provisions of the NFC. [redacted]

Definitions

1. For purposes of this Appendix I of the Nuclear Fuel Contract (NFC), the terms listed below shall have the meanings defined beside them.

   A. **Computer Codes**: Computer codes (software) to be provided by the Supplier to the Owner as part of the Means of Fuel Management, specified in Appendix H (in particular in part H.3 of Appendix H) of the NFC.

   B. [redacted]

   C. [redacted]

D. **Configuration Data:** Plant-specific data that is used in conjunction with the Computer Codes and/or hardware, including tuning and set point constants, numerical, graphical, pictorial and text files that configure the Computer Codes or hardware for the specific environment of the Plant.

Provision of Computer Codes, Configuration Data, Documentation and Source Codes and related Intellectual Property Rights

2. The Supplier shall, as part of the Means of Fuel Management, provide the Owner with the Computer Codes, Configuration Data and Documentation which shall enable the Owner (together with other Means of Fuel Management) to perform independently of the Supplier the Reload Core Design, reload safety evaluation and other activities in accordance with Article 2.2.4 of the NFC, Appendix H of the NFC and other provisions of the NFC relating to the Means of Fuel Management. For the avoidance of doubt, any activities in relation to Computer Codes, Configuration Data, Documentation and Source Codes by the Owner under this Appendix I of the NFC shall be performed for the NFC Permitted Purposes.

   If so selected by the Owner in accordance with Article 2.2.4 of the NFC, the Supplier shall also provide the Owner with Source Codes of the Computer Codes.

3. The provisions of Sections 21.1, 21.2, 21.3 and 21.5 of the NFC shall apply also to the Computer Codes, Configuration Data, Documentation, including provisions regarding Owner's license and its scope (including its geographical scope, the term of the license and relevant purposes for which the license is granted), Owner's right to make modifications, Owner's right to grant authorizations under the license to third parties/sublicences, remuneration for the rights granted by the Supplier to the Owner, protection against third-party claims, remedies, etc.

   [redacted]

4. [redacted]

5. [redacted]

Intellectual Property Ownership and Confidentiality

6. [redacted]

[redacted]

7. Provisions of Section 13.2 (Confidentiality) of the NFC shall apply also to the Computer Codes, the Configuration Data, Source Codes and Documentation.

Owner's Modifications and Use for Verification or Validation of other Computer Programs

8. [redacted]

9. [redacted]

Training

10. The Supplier shall provide training to the Owner's operating personnel as part of the Means of Fuel Management which shall, inter alia, enable such personnel to fully use the Computer Codes for Reload Core Design and reload safety evaluation. The training shall be provided in accordance with Appendix J.

Schedule

11. The Supplier shall deliver the Computer Codes, Configuration Data, Source Codes and Documentation in accordance with Appendix R of the NFC and part H.5 (Scheduling) of Appendix H of the NFC.

Quality Management

12. The Supplier shall ensure that the Computer Codes, Configuration Data, Source Codes and Documentation shall comply with the quality management requirements set forth in Chapter 20 of the NFC and in the Mandatory Law, Requirements of the Authorities and NFC Codes and Standards. Chapter 20 of the NFC shall apply also with respect to the Computer Codes, Configuration Data, Source Codes and Documentation.

Title Warranty

13. [redacted]

[redacted]

Other Warranties

14. [redacted]

15. [redacted]

16. [redacted]

17. [redacted]

18. [redacted]

19. [redacted]

Updates, Upgrades, Maintenance and Modifications, Technical Support and Problem Report System

20. [redacted]

21. The Supplier shall provide technical support and problem report system in a systematical way to assist the Owner in using the Computer Codes, Configuration Data, Source Codes and Documentation during the warranty period referred to in paragraph 18 above. [redacted]

22. [redacted]

Limitation of Liability

23. The limitation of liability under Section 23.2 shall apply also in connection with this Appendix I [redacted]

NUCLEAR FUEL CONTRACT

APPENDIX J

DOCUMENT NAME:	NUCLEAR FUEL CONTRACT APPENDIX J

J - TRAINING PROGRAMS

J.1 TRAINING PROGRAMS PURPOSE

All training programs associated with the provision of the Means of Fuel Management and provided to the Owner in accordance with the Article 2.2.4.9 are further denoted as “Training Programs”. Training Programs shall be structured for the purpose of providing Owner’s trainees with a working knowledge of, and training in the application of, Supplier’s Computer Codes (computer programs and other tools), methods and procedures in order to perform the activities which are the subject of the training. The ultimate goal of the Training Programs shall be the ability of the Owner’s employees to perform the activities independent of the Supplier.

[redacted]

J.2 TRAINING PROGRAMS SCOPE

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

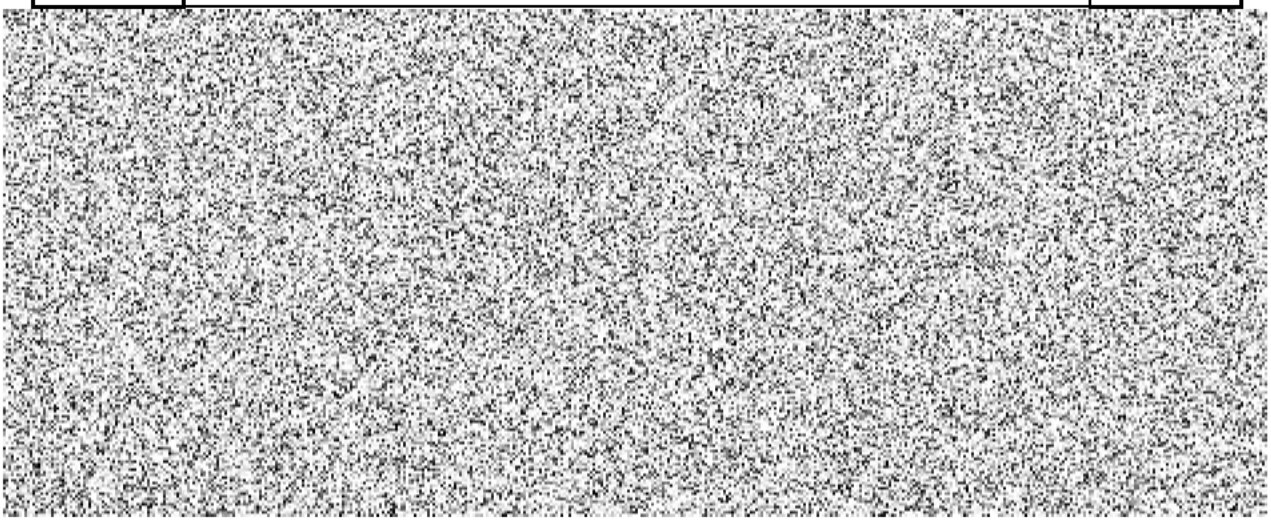
[redacted]

[redacted]

The training scope is summarized in next table:

Table J.2.1 The Summary of Training Scope

[redacted]



J.3 TRAINING PROGRAMS DESCRIPTION AND LOGISTICS

Each Training Program shall include:

[redacted]

A certificate of completion shall be provided to Owner's trainees upon completion of each Training Program.

[redacted]

Training Programs shall be delivered for up to eight (8) Owner trainees. The specific number of trainees will be determined upon mutual agreement.

In making modifications, the professional competence, experience and qualifications should be confirmed, and it should be ensured that the quality assurance system complies with the applicable standards in effect at the Plant.

Required technical areas and the qualification requirements for the Owner's staff to perform Category 1 Plant Modifications are commensurate with those for the design engineers of the Supplier's NPP design organizations.

The Owner's staff which have expertise and positions are required:

[redacted]

The staff responsibility is described as following:

- [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Class Room Training (CRT)

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

On the Job Training (OJT)

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

On the Job Participation (OJP)

[redacted]

[redacted]

[redacted]

J.4 SCHEDULING

[redacted]

NUCLEAR FUEL CONTRACT

APPENDIX K

DOCUMENT NAME:	NUCLEAR FUEL CONTRACT APPENDIX K

K - PHYSICS START-UP PROGRAM

K.1 PHYSICS START-UP PROGRAM PURPOSE

The purpose of the physics start-up program is to develop and provide an integrated program leading to successful physics start-up testing of the Core. The ultimate goal of the whole program is to develop methods and provide resources to verify selected Core Design characteristics during Plant start-up. The program shall be solely focused on a set of physics start-up tests stipulated by the Mandatory Law and the Supplier. The program shall enable the Owner to adequately perform Core testing with the Supplier's Technical Assistance and/or Supervision (if applicable). The Owner shall be able to perform such activities in compliance with the licensed safety standards and methods using Supplier's latest commercially used technologies.

The physics start-up program shall cover both the First Core physics start-up testing and also subsequent Reload Cores physics start-up testing, including necessary modifications of relevant methods and specific documentation, if applicable.

The physics start-up program for First Core start-up testing shall comply with requirements given in EPC Contract Construction and Commissioning Document, Section 3.6.

Requirements related to physics start-up program are defined in the following paragraphs.

K.2 PHYSICS START-UP PROGRAM SCOPE

The following tasks define the Supplier's activities (if not mentioned otherwise) associated with providing physics start-up program:

[redacted]

[redacted]

[redacted]

Table K.2.1 Low Power Physics Test Criteria

[redacted]

Table K.2.2 Power Ascension Test Criteria

[redacted]

- [redacted] Owner shall review both documents to become familiar with the physics start-up tests requirements, plant hardware, methods, testing sequence and software used and to be adequately prepared to perform testing activities.
- Supplier's on-site Technical Assistance for reactor engineers for physics start-up testing. During the start-up, on-site Technical Assistance - in accordance with the provisions defined in the NFC scope of supply, Article 2.2.3.4 and in Terms and Conditions of the EPC Contract - shall be provided to support Owner in the performance of the physics start-up testing according to the physics start-up manual. on-site Technical Assistance shall be provided prior to Core loading and continue through full power operation. Participation during pre-critical and power ascension testing periods may be limited to various power testing hold points.
- Off-site (in-house) data analysis and reporting by Supplier. During the start-up testing period, in-house data analysis and evaluations shall be performed to support the on-site effort.
- [redacted]