CONTRACT

DECONTAMINATION OF THE PRIMARY CIRCUIT

CONTRACT N°: BIDSF 019 1 001

between

Jadrová a vyraďovacia spoločnosť, a.s.

and

CONSORTIUM OTNI – ROBO - CHEMCOMEX

Dated: _____

BIDSF project D2

DECONTAMINATION OF THE PRIMARY CIRCUIT

A. The Contract Agreement

CONTRACT AGREEMENT

This Agreement made the_____day of_____

Between, **Jadrová a vyraďovacia spoločnosť, a.s.** a state owned joint stock company duly organized and existing under the Laws of the Slovak Republic with its registered office located at Tomášikova 22, 821 02 Bratislava, Slovak Republic and registered with the Trade Register of the District court Bratislava I in section Sa under number 4649/B, Company Identification No.: 35 946 024, duly represented by Ing. Peter Čižnár – Chairman of the Board of Directors and Ing. Miroslav Obert – Vice-Chairman of the Board of Directors, entrusted with the relevant powers in compliance with the Statute of Jadrová a vyraďovacia spoločnosť, a.s. (hereinafter called "the Employer") of the one part,

and of the other part, Consortium OTNI – ROBO – CHEMCOMEX, consisting of the following entities, each of which will be jointly and severally liable to the Employer for all the Contractor´s obligations under this Contract, namely:

O.T.N.I. - ONET TECHNOLOGIES NUCLEAR INTERNATIONAL SAS, a lead partner of the Consortium, a simplified limited company duly organized and existing under the laws of France with its registered office located at 36 Boulevard de l'Océan, CS 20280, 13258 Marseille cedex 09, France and registered with the Register of Commerce of the Court of Commerce of Marseilles under the number 063 501 951, duly represented by Mr. Francois Le Hen – authorised representative and Mr. Dominique Antoine Domingo Antonio Marin – authorised representative, entrusted with the relevant powers in compliance with the Power of Attorney signed by the legal representative of O.T.N.I. - ONET TECHNOLOGIES NUCLEAR INTERNATIONAL SAS - Onet Technologies SAS by Mrs. Dominique Mouillot (president of Onet Technologies SAS)

and

CHEMCOMEX PRAHA, a.s., a partner of the Consortium, a joint-stock company duly organized and existing under the laws of Czech Republic, with its registered office located at Elišky Přemyslovny 379, 156 00 Praha 5 – Zbraslav, Czech Republic and registered with the Trade Register of the Municipal court in Prague in section B under number 4287, Company Identification No.: 250 76 451, duly represented by Mr. Miroslav Mrtvý as Vice-Chairman of the Board of Directors entrusted with the relevant powers in compliance with the Statue of CHEMCOMEX PRAHA, a.s.

and

ROBO Piešťany, a.s., a partner of the Consortium, a joint-stock company duly organized and existing under the laws of Slovak Republic with its registered office located at Royova 2, 921 01 Piešťany, Slovak Republic and registered with the Trade Register of the District court Trnava in section Sa under number 10027/T, Company Identification No.: 36 223 204, duly represented by Mr. Robert Levčík as Vice-Chairman of the Board of Directors, entrusted with the relevant powers in compliance with the Statue of ROBO Piešťany, a.s.

(hereinafter together called "the Contractor")
Whereas the Employer desires that the Works known as "Decontamination of the Primary Circuit" should be executed by the Contractor, and has accepted a Tender by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, for the purpose of interpretation, the priority of the documents shall be in accordance with the following sequence:

A. This Contract Agreement
B. The Letter of Acceptance
C. The Letter of Tender
D. The Conditions of Particular Application
E. The Appendix to Tender
F. The General Conditions
G. Clarification questions and answers
H. The Employer's Requirements constituted by:
   - H1. Technical Specifications,
   - H2. Project Baseline Time Schedule,
   - H3. Drawings and other Documentation,
   - H4. QA and QC surveillance requirements,
   - H5. Safety and Technical Conditions,

I. The Contractor's Proposal constituted by:
   - I1. Technical proposal,
   - I2. Project organization and Project Baseline Time Schedule,
   - I3. Price Schedules,
   - I4. List of Subcontractors,

J. Performance Security

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to design, execute and complete the Works and remedy any defects therein, in conformity with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price of Euro 6 259 161,42 that is: six million two hundred and fifty-nine thousand, one hundred and sixty-one Euro and forty-two cents within 20 months from the Commencement date and in compliance with Project Baseline Time Schedule and in the manner prescribed by the Contract.

5. The Contractor acknowledges, that all eligible payments due to the Contractor pursuant to the Contract shall be approved by the Bank and therefore the Employer shall not be responsible for paying to the Contractor (or carrying out) any payments from the Contract other than those

approved and accepted by the Bank in compliance with the terms and conditions set forth in this Contract.

6. This Agreement shall become effective on the following day after publication of this Agreement according to the Act 211/2000 Coll. on free disclosure of information and on change and amendment of certain acts (act of information freedom), as amended.

In Witness whereof the parties hereto have caused this Agreement to be executed the day and year first before written in accordance with their respective laws.

SIGNED by:	SIGNED by:
Ing. Miroslav Obert – Vice-Chairman of the Board of Directors	Mr. Francois Le Hen -authorised representative of O.T.N.I. - ONET TECHNOLOGIES NUCLEAR INTERNATIONAL SAS based on Power of Attorney dated 25th May 2012
Ing. Peter Čižnár – Chairman of the Board of Directors	Mr. Dominique Antoine Domingo Antonio Marin - authorised representative of O.T.N.I. ONET TECHNOLOGIES NUCLEAR INTERNATIONAL SAS based on Power of Attorney dated 25th May 2012
	Mr. Miroslav Mrtvý - authorised Representative of CHEMCOMEX PRAHA, a.s. based on Power of Attorney dated 31st May 2012
	Mr. Robert Levčík - authorised representative of ROBO Piešťany a.s. based on Power of Attorney dated 31st May 2012
for and on behalf of the Employer	for and on behalf of the Contractor
Date:	Date:

BIDSF project D2

DECONTAMINATION OF THE PRIMARY CIRCUIT

B. The Letter of Acceptance

LETTER OF ACCEPTANCE

Bratislava, 28th November, 2012

TO: O.T.N.I. - ONET TECHNOLOGIES NUCLEAR INTERNATIONAL SAS, 36 Boulevard
de l'Océan, CS 20280, 13258 Marseille cedex 09, France

This is to notify you that your tender dated 01st of June 2012 for the execution of the ***D2 – Decontamination of the primary circuit*** for the Contract Price of the equivalent of Euro 6 259 161,42 that is: six million two hundred and fifty- nine thousand, one hundred and sixty-one Euro and forty-two cents as corrected and modified in accordance with the Instructions to Tenderers, is hereby accepted by us.

You are hereby required:

(a) to submit the performance security for 10% of the Accepted Contract Amount, in the currencies and proportions in which the Contract Price is payable;

(b) sign the attached Contract Agreement and return to;

BIDSF PMU - Procurement Group
Jadrová a vyraďovacia spoločnosť, a.s.
Tomášikova 22
821 02 Bratislava
Slovak Republic

(c) to commence performance of the said contract in accordance with the Contract Documents.

Authorised Signatures:

.....	.....
Ing. Peter Čižnár	Ing. Miroslav Obert
Chairman of the Board of Directors	Vice-Chairman of the Board of Directors

Name of Employer: Jadrová a vyraďovacia spoločnosť a.s.

Attachment: Contract Documents

BIDSF project D2

DECONTAMINATION OF THE PRIMARY CIRCUIT

D. The Conditions of Particular Application

CONDITIONS OF PARTICULAR APPLICATION TO GENERAL CONDITIONS

1 General Provisions	
1.1.1 The Contract	Add Sub-Clause 1.1.1.11 **"Intellectual and Industrial Property Rights"** means intellectual property rights referred to in Sub-Clause 17.5 [*Intellectual and Industrial Property Rights*]
1.1.2 Parties and Persons	Delete Sub-Clause 1.1.2.8 and substitute with: "Subcontractor" means any person named in the Contract as a Subcontractor, or specialist Subcontractor, or any person appointed as a Subcontractor, for a part of the Works; and the legal successors in title to each of these persons. Add Sub-Clause 1.1.2.11 "**PMU team"** means the Project Management Unit formed by the Employer, as part of the Employer's Shutdown Department to undertake the management and implementation of the BIDSF funded or co-funded projects for Bohunice NPP V1. Add Sub-Clause 1.1.2.12 **"Commercial Code"** means Act No. 513/1991 Coll. Commercial Code, as subsequently amended.
1.1.3 Dates, Tests, Periods and Completion	Delete Sub-Clause 1.1.3.2. and substitute with: 1.1.3.2. **"Commencement Date"** means the date notified by the Engineer as specified under Sub-Clause 8.1. The Contract becomes legally effective on the Commencement Date. Delete Sub-Clause 1.1.3.7 **"Defect Notification Period"** and substitute with: 1.1.3.7 **"Defect Notification Period"** or **"Contractor Warranty Period"** means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 11.1 [*Completion of Outstanding Work and Remedying Defects*], as stated in the Appendix to Tender (with any extension under Sub-Clause 11.3 [*Extension of Defects Notification Period*]), calculated from the date on which the Works or Section is completed as certified under Sub-Clause 10.1 [*Taking Over of the Works and Sections*]. Add Sub-Clause 1.1.3.10 **"Certificate of Temporary Operation"** means a certificate issued under Clause 10.2 [*Taking Over of Parts of Work*]
1.1.4 Money and Payments	Delete Sub-Clause 1.1.4.4 and substitute with: 1.1.4.4 "Final Payment Certificate" means the Final Deliverable Acceptance Protocol issued under sub-Clause 14.13 [Issue of Final Payment Certificate]. Delete Sub-Clause 1.1.4.7 and substitute with: 1.1.4.7 "Interim Payment Certificate" means a Deliverable Acceptance Protocol issued under Clause 14

	[Contract Price and Payment] other than the Final Deliverable Acceptance protocol." Delete Sub-Clause 1.1.4.9 and substitute with: 1.1.4.9 "Payment Certificate" means a Deliverable Acceptance Protocol issued under Clause 14 [Contract Price and Payment]"
1.1.5 Works and Goods	Delete Sub-Clause 1.1.5.5 "Plant" and substitute with: 1.1.5.5 **"Plant"** means equipment, machinery, and other tangible items including monitoring, information processing and communications related hardware and software systems, intended to form or forming part of the Permanent Works.
1.1.6 Other Definitions	Add the following definitions: 1.1.6.10 The **"European Bank for Reconstruction and Development (EBRD) 'the Bank'**," is the Administrator of the grant(s), which refers to the funds made available to the Employer (the Recipient) under an Agreement between the Bank as the Administrator of funds of the Bohunice International Decommissioning Support Fund and the Recipient of such funds under the established rules. 1.1.6.11 The **"Project"** means the project D2 – "Decontamination of the Primary Circuit", located at V1 Bohunice Nuclear Power Plant, Slovak Republic, for which the Works under this Contract shall be performed by the Contractor. 1.1.6.12 The "Programme" means the document entitled "Project Baseline Time Schedule" and specified in H1 – Technical Specification.
1.3 Communications	Delete a) and b) and substitute by: Any document, information, notice, correspondence or other communication to be given by one Party to the other Party or to the Engineer relating to the Contract shall be in writing and in the English language and may be delivered in person (against receipt) or by letter (registered post and against receipt) or facsimile (confirmed by the addressee personal answer back), addressed to the other Party or the Engineer in accordance with the following provisions of this clause.
1.4 Law and Language	After the first paragraph add the following: Unless the Contract provides otherwise, the mutual contractual relationship explicitly not governed by the Contract shall be governed by the provisions of the Commercial Code. Without prejudice to any provision of this Contract, the Parties agrees that application of any legal regulation of the Slovak republic which is not mandatory is explicitly excluded in the scope in which its application could change (in the whole or in the part) meaning or content of any provision of this Contract.
1.5 Priority of the Documents	Delete and replace by: The documents forming the Contract are to be taken as mutually explanatory of one another. For purposes of interpretation, the priority of the documents shall be in accordance with the following sequence: 1) A. The Contract Agreement 2) B. The Letter of Acceptance 3) C. The Letter of Tender

	4) D. The Conditions of Particular Application 5) E. The Appendix to Tender 6) F. The General Conditions 7) G. Clarification questions and answers 8) H The Employer's Requirements constituted by: H1 Technical Specifications, H2 Project Baseline Time Schedule, H3 Drawings and other documentation, H4 QA and QC surveillance requirements, H5 Safety and Technical Conditions 9) I. The Contractor's Proposal constituted by: I1 Technical Proposal, I2 Project organization and Project Baseline Time Schedule, I3 Price Schedules, I4 List of subcontractors, 10) J. The Performance Security If an Ambiguity or discrepance is found in the documents, Section 266 of the Commercial Code shall apply.
1.15 Confidentiality	Add Sub-Clause 1.15: With the signing of this Contract the Contractor hereby gives its consent to publish on the website of the Employer and on any other places chosen by the Employer, for an indefinite time period, the whole Contract including any eventual future amendments and appendixes and enclosures of the Contract and any other documents related to the Contract. Also, the Contractor hereby gives its consent to publish on the website of the Employer and on any other places chosen by the Employer for an indefinite time period any invoices issued by the Contractor in relation to this Contract. The Employer shall bear all costs related to the publication of the above mentioned documents. To avoid any uncertainties, the Contractor grants also its consent to publish information underlying trade secrecy according § 17 of the Commercial Code contained in the above mentioned documents by means as stated above whereby the publication of these information does not represent breach of the trade secrecy by the Employer. Also, the Contractor hereby acknowledges that any information provided by the Contractor contained in the abovementioned documents shall not be considered as confidential according §271 of the Commercial Code. The Employer shall not publish information which are prohibited to be published under Slovak Laws. Despite of the above authorization of the Employer to publish the above mentioned documents, the Contractor shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out obligations under it or to comply with applicable Laws. The Contractor shall not publish, permit to be published, or disclose any particulars of the Works in any trade or technical paper or elsewhere without the previous written agreement of the Employer. Without a written agreement of the Employer, the Contractor shall be liable for any damages caused by provision of this information to third persons.

1.16 EBRD and Employer Audits	Add Sub-Clause 1.16: The Contractor shall permit the Bank and/or the Employer to inspect the Contractor's accounts and records relating to the performance of the Contract and to have them audited by auditors acceptable to the Bank or the Employer.
1.17 Irrevocability of the granted licenses	Add Sub-Clause 1.17: Any license granted to the Employer to access and use Software supplied to the Employer under the Contract, shall be irrevocable
1.18 Authorized representative	Add Sub-clause 1.18: Any action required or permitted to be taken, and any document required or permitted to be executed, with the exception of adjustments to the Contract Price or the Price Schedules or the Quantities and Prices under Clause 13.3 [Variations Procedure], under this Contract by the Employer or the Contractor may be taken or executed by the officials: For the Employer: as specified in E - Appendix to Tender, Sub-clause 1.1.2.4 & 1.3 For the Contractor: Mr. Francois Le Hen and Mr. Dominique Antoine Domingo Antonio Marin
2. The Employer	
2.2 Permits, Licenses or Approvals	At the end of Sub-Clause 2.2 Any proposal, inspection, examination, testing, consent, approval or similar act by the Employer (including absence of disapproval) shall not relieve the Contractor from any responsibility, including responsibility for his errors, omissions, or discrepancies, and non-compliance with Sub-Clauses 5.3 [*Contractor's Undertaking*] and 5.4 [*Technical Standards and regulations*].
2.4 Employer's Financial Arrangements	At the end of Sub-Clause 2.4 add: Pursuant to an agreement between the Bank as the Administrator of the Fund (the Fund) and the Employer as Recipient of the grant(s) being administered by the Bank, the Employer intends using part of the proceeds of the grant(s) for eligible payments under the Contract. Payment by the Bank will be made on behalf of the Employer and only at the request of the Employer and upon approval by the Bank in accordance with the terms and conditions of the Grant Agreement and will be subject in all respects to the terms and conditions of that agreement. The proceeds of the Bank's grant(s) will not be used for payments to persons or entities or for any import of goods if such payment or import is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. Except as the Bank may specifically otherwise agree, no other party other than the Employer shall derive any rights from the agreement or have any rights to the proceeds of the grant(s).
3. The Engineer	
3.1 Engineer's	At the end of Sub-Clause 3.1 add: The duties of the Engineer shall be exercised by the Head of preparation

Duties and Authority	and implementation of V1 NPP decommissioning section.
3.2 Delegation by the Engineer	Delete in the second paragraph the following text: "And who are fluent in the language for communications defined in Sub-Clause 1.4 [Law and Language]
3.6 Management Meeting	Add Sub-Clause 3.6: The Engineer may require the Contractor to attend management meeting at times and places to be specified by the Engineer. The Contractor shall appoint qualified personnel, with authority, to participate in such meetings. The business of each management meeting shall be to review the anticipated arrangements for future work and to resolve any matters raised in accordance with this Sub-Clause. The Engineer shall record the business of monthly progress meeting and provide copies of this record to those attending the meeting and to the Employer. The responsibility of the parties for any actions to be taken shall be included in such record and shall, if not agreed in accordance with the Contract, be submitted by the Engineer. The Contractor's Representative shall notify the Engineer at the earliest opportunity of specific likely future events or circumstances, which may adversely affect the work, increase the Contract Price or delay the execution of the Works. The Engineer may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances, and/or a proposal under Sub-Clause 13.3. The Contractor shall submit such estimate and/or proposal as soon as practicable. The Contractor's Representative shall co-operate with the Engineer in making and considering proposals to mitigate the effect of any such event or circumstances, and in carrying out instructions of the Engineer.
4. The Contractor	
4.2 Performance Security	In the second paragraph, replace the first sentence by the following: The Contractor shall deliver the Performance Security to the Engineer within 28 days after receiving the Letter of Acceptance.
4.3 Contractor's Representative	After the third paragraph, add: If the Contractor asks the Engineer for a replacement of the Contractor's Representative, the Engineer shall not withhold his prior consent provided that suitable replacement person is appointed. After the last paragraph, add: If the Contractor's Representative, or such persons, is not fluent in Slovak and/or English, the Contractor shall make a competent interpreter available during all working hours.
4.4 Subcontractors	Delete Sub-Clause 4.4 (b) and substitute with: (b) The prior consent of the Engineer in the form specified in Sub-Clause 1.3 shall be obtained to other proposed Subcontractors,

	After the last paragraph, add: (d) Where practicable, the Contractor shall give a fair and reasonable opportunity for contractors from Slovakia to be appointed as Subcontractors. (e) Assignment of Benefit of Subcontractor If a subcontractor's obligations extend beyond the expiry date of the relevant Defects Notification Period, the Contractor shall so inform the Engineer and subject to the consent of the Engineer, the Contractor shall assign the benefit of such obligations to the Employer as of the expiry date of the relevant Defects Notification Period.
4.8 Safety Procedures	At the end of Sub-Clause 4.8 add: The Contractor shall be solely responsible for conducting operations under this Contract to avoid risk of harm to the health and safety of persons and property and for inspecting and monitoring all its plant, equipment, materials, and work practices to ensure compliance with its obligations under this Contract. The Contractor's failure to correct any unsafe condition or unsafe act by its employees or his Subcontractors may, at the sole discretion of the Engineer or the Employer, be grounds for notice by the Engineer or the Employer instructing the Contractor or his Subcontractors to immediately stop the affected works or operations until the unsafe act or condition is corrected to the Employer's satisfaction, at the Contractor's expense. In the event of immediate danger, verbal notice may be given followed by written notice within 2 days. If the unsafe act or condition continues despite notice and reasonable opportunity to effect a resolution, the Employer may, at its sole discretion, correct, or have corrected, the unsafe act or condition at the Contractor's expense pursuant to Sub-Clause 11.4 [Failure to Remedy Defects] or terminate this Contract pursuant to Clause 15 [Termination by Employer]. Except as stated below, the Contractor shall furnish all safety equipment required to safely complete the Works and shall require the use of such safety equipment, and shall provide safety instructions to its employees. All safety equipment must be manufactured to a standard acceptable to the Employer. The Employer will provide the Contractor's personnel and his Subcontractor's personnel with basic clothing used to perform works in the radiation controlled area (i.e., white cotton overalls, footwear, hard hat, jacket, thermal underwear (in the winter)), and gloves, goggles, respirator, and plastic-wear as required). The Employer will provide service of radiation protection to the Contractor's and his Subcontractors' personnel, guidance to the Contractor and his Subcontractors on the radioactive environment of the Site and will provide radiation monitoring allowing identification of radiation sources. The Employer will also provide radiation monitors to insure that the Contractor and his Subcontractors are following appropriate radiation safety practices. If hazardous or unknown materials are encountered, the works shall stop

	until the Contractor's health protection representative or other qualified individual can identify and ensure it is safe to continue working. As required, the health protection shall specify the means of safe disposal for any hazardous material. If dedicated radiation limit is encountered, the Contractor and his Subcontractors shall immediately stop the affected works or operations and leave the affected area. Verbal notice may be given followed by written notice within 2 days. The Employer shall provide the Contractor's personnel withdrawal outside the high and intermediate level waste area. Such works or operations affected by the radioactive wastes shall not resume until the condition is corrected to the Employer's satisfaction (by others), at the Employer's expense. The Employer will endeavour to remedy the situation within 3 days. The Contractor shall have no authority or responsibility for the accumulation, removal, temporary storage, transportation, or disposal of radioactive high and intermediate level wastes at the Site. As a minimum, the Contractor's Safety Procedures shall conform to and comply with: - All applicable laws, ordinances, statutes, rules, regulations, and codes governing safety and health in the workplace, and Contractor's specific scope of Works under this Contract. - The Contractor shall instruct its personnel on the requirements of his Safety Plan, other safety related plans, and coordinate with other contractors and subcontractors on Site regarding safety matters. - The Contractor shall take into account the provisions of the requirements of the Employer subject of H5 "Safety and Technical Conditions".
4.9 Quality Assurance	After wording: The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract to be added: in accordance with H4 "QA and QC Surveillance requirements"
4.16 Transport of Goods	Delete in (a) 21 days' notice and replace for 30 days' notice.
4.19 Electricity, Water and Gas	To be added: The Contractor shall supply the material and installation of the networks of the below indicated utilities inside the NPP V1 and shall be full responsible for the provision of any other service he may require. All energy and services related to the implementation of this Project requested to the Employer by the Contractor will be charged to the Contractor in accordance with part I3 of the Contract, Schedule "A-5" – Utility Expenses.
4.20 Employer's Equipment And Free-Issue	Not applicable The Employer will not make available equipment for the use of the Contractor.

Material	
4.21 Progress Reports	After the last paragraph, add: In addition to the Monthly Progress Reports identified above, the following reports shall be prepared, submitted and kept updated in a consistent manner by the Contractor to Engineer's in the form, format, and quantity required: 1. Project Baseline Time Schedule; covering the whole project from Contract Commencement Date to the take-over process. 2. Detailed Design/Engineering Plan; identifying all the main engineering and design activities, interfaces and the documents to be produced within the project. 3. Detailed Licensing and Procurement Plan; identifying the licensing for the decontamination project and all supply required for the performance of the works. 4. Detailed Erection/Installation Plan; indicating the major dismantling, plant modifications, erection (installation) and duration of major activities, and shall be coordinated with the delivery dates of major components and systems. 5. Detailed Testing, Commissioning and Decontamination Operation Plan; indicating the major testing, commissioning and decontamination implementation logic and duration of major activities and shall be coordinated with the start date of operational test. Monthly submittals are due by the 7th day of the month following the month being reported on (or the last work-day before the 7th if the 7th occurs on a non-workday)
4.22 Security on the Site	To be added: The Contractor shall fulfil the requirements stated in H5 "Safety and Technical Conditions".
4.23 Contractor's Operations on Site	To be added: The Contractor shall fulfil the requirements stated in H5 "Safety and Technical Conditions".
5. Design	
5.2 Contractor's Documents	In the fourth paragraph replace: "each review period shall not exceed 21 days", by "each review period shall not exceed 42 days" In the fourth paragraph after the first sentence add the following: If the Contractors' documentation is subject to permission or authorization of Regulators, the review and approval period shall be extended for the period of the Regulators' authorization.
5.4 Technical Standards and	After second paragraph add: National or international standards other than the Country's that ensure substantial equivalence or more stringent requirements will be acceptable,

Regulations	after approval by the Employer.
5.6 As-Built Documents	In the first paragraph, delete two copies and replace by three (3) copies in electronic version. In the last paragraph, delete types of copies and substitute types of electronic and hard copies in a format acceptable to the Engineer.
6. Staff and Labour	
6.6 Facilities for Staff And Labour	To be deleted and replaced by: The Employer shall ensure for the use by the Contractor and his personnel, of the following facilities: a) Office accommodation for the Contractor at Bohunice V1 NPP site of at least 20m2 but not more than 40m2 in good decorative order and suitably furnished and with the following services: - Heat, light and power at no cost to the Contractor, - International telephone lines for telephone, fax, and e-mail connections. The cost of all telephone calls shall be met by the Contractor, a) Provisions of information and documentation on all technical and commercial data, documentation, drawings etc. that could be relevant for the Project and establishment of adequate and optimized interfaces to other departments of Bohunice V1 NPP, b) Permission for reasonable use by the Contractor of other facilities, e.g. meeting rooms, by agreement with the Employer's management. c) Access to the Employer´s controlled site, including required facilities for washing and changing clothes, toilets, etc. d) Access to the Employer´s health and safety facilities, including dosimeters, industrial safety, first aid, ambulance and emergency services at no cost to the Contractor. e) Access to the Employer's canteen at the Bohunice NPP site f) Contractor's reasonable requirements for truck parking, car parking and storage (location shall be allocated by agreement with Employer´s management) at the Bohunice NPP site at no cost to the Contractor. g) Reasonable storage facilities for Contractor´s Project Equipment (location shall be allocated by agreement with Employer´s management). The above facilities/services requested and received free of charge by the Contractor from the Employer, shall be listed, signed and approved by the Employer pursuant to Sample forms in H5 (Safety and Technical Conditions).
6.7 Health & Safety	At the beginning of Sub-Clause 6.7, add: To the extent allowed by law, the Contractor shall assume all responsibility and liability with respect to all matters regarding the safety and health of its employees and the employees of his Subcontractors, with respect to the

	risks under this Contract. Add into second paragraph after wording "responsible for maintenance safety and protection against accidents" the words "in accordance with Act 396/06 Col.
6.8 Superintendence	At the end of Sub-Clause 6.8 add: At least one of the Contractor´s superintending staff shall have a working knowledge of Slovak language or the Contractor shall have competent interpreting services available on Site during all working hours.
6.9 Contractor's personnel	to be added after (d) e) is guilty of serious misconduct f) is involved in any conduct which is considered as fraudulent, corrupt, coercive or collusive practice g) fails to comply with Slovak Law in discharging his assigned duties At the end of the last paragraph, add: Such replacement shall be at Contractor's cost and shall not be cause of an extension of time under Sub-clause 8.4 (Extension of Time for Completion)
7. Plant, Materials and Workmanship	
7.1 Manner of Execution	At the end of the sub-clause add the following new paragraphs: Plant and Materials to be incorporated in the Works shall be new, unused, and of the most recent or up-to-date models and incorporate all recent improvements in design and materials, unless otherwise provided for in the Employer's Requirements. Where national standards of the Country are specified, Plant, Materials, and workmanship that meets other authoritative standards, and which ensure an equal or higher quality of performance and work execution, also acceptable.
7.8 Royalties	Delete Sub-Clause b) and substitute: The Contractor shall be responsible for manipulation, transport and disposal of the wastes in accordance with H1 – Technical Specification.
7.9 Eligibility	All Goods shall have their origin in eligible source countries as at 1st January 2012 they are: EU member states, Switzerland, and the EBRD´s Countries of Operations.
9. Tests on Completion	
9.1 Contractor's obligations	Delete first paragraph of Sub-Clause 9.1, and substitute: The Contractor shall carry out the Tests on Completion in accordance with this Clause, and Sub-Clause 7.4 [Testing] and the H1 - Technical Specification [chapter Testing & Acceptance], after providing the

	documents in accordance with Sub-Clause 5.6 [As-Built Documents] and Sub-Clause 5.7 [Operation and Maintenance Manuals].
10. Employer's Taking Over	
10.1 Taking Over the Works and Sections	Delete in the first paragraph the last sentence: "or is deemed to have been issued in accordance with this Sub-Clause." Replace in the last paragraph, in the last sentence "the Taking- Over Certificate shall be deemed to have been issued on the last day of that period", with "the Contractor shall be entitled to claim subject to Sub-Clause 20.1 [Contractor's Claims]".
10.3 Interference with Tests on Completion	Replace in the first paragraph "the Employer shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed" with "it shall be entitled to claim subject to Sub-Clause 20.1 [Contractor's Claims]."
13. Variation and Adjustments	
13.1. Right to Vary	After the first paragraph add the following: Substantial variations to the Contract including variations to the total Contract Price and to the Time for Completion of the Works must be made by means of an addendum and may not be instructed by the sole discretion of the Engineer.
13.5 Provisional Sums	Not applicable
13.6 Day work	Not applicable
14. Contract Price and Payment	
14.1 The Contract price	a) delete and replace by: The Contract Price shall be the Accepted Contract Amount and shall be a fixed lump-sum including all staff costs, Subcontractors' costs, printing, communications, travel, accommodation, and the like, and all other costs incurred by the Contractor in carrying out the Works described in the Employer's Requirements and in accordance with the contractual requirements. The Contract Price shall not be subject to variation during the implementation of the Contract unless it is stated otherwise in the Contract's conditions. The Contract price shall be without any and all taxes, customs duties levied in the territory of the Slovak Republic. b) to be added after "duties and fees required to be paid by him under the contract", the following text "in the country of his operation".

	To be added in the end: In the field of taxes, customs duties and fees the course of action shall be taken in accordance with the Framework Agreement concluded between the EBRD and the Slovak Republic: http://www.javys.sk/en/bidsf/framework-agreement)
14.4 Schedule of Payments	Last paragraph delete and replace by: Referring to the first paragraph, the following Schedule of Payments shall be the basis for the payment milestones in which the Contract Price will be paid, confirmed by the Acceptance protocol of: 1. Approval of the Process Design Report 5 % 2. Granted Nuclear Authority decision 5 % 3. Start of Works on Site 10 % 4. Pre-operational Tests Report for 1st unit 15 % 5. Pre-operational Tests Report for 2nd unit 15 % 6. Finished Decontamination process of 1st unit (Unit No. 1 Decontamination Protocol) 20 % 7. Finished Decontamination process of 2nd unit (Unit No. 2 Decontamination Protocol) 20 % 8. Acceptance of the Final Contract Completion Report 10 %
14.7 Payment	To be added at the end: The following points shall be observed when submitting invoices for payment. All invoices with the accepted protocols and itemized specification of performed Works and delivered Goods with prices, shall be addressed and sent to the Employer who will approve them and forward them to the Bank for payment. The Bank in turn will approve the invoices prior to paying the Contractor on behalf of the Employer. All foreign invoices shall be issued bilingually in English and Slovak language. The name and telephone number of a person who may be contacted in case of need to raise queries shall be quoted on the invoice. The contract number and the payment milestone shall be quoted on the invoice. Invoices shall be marked as an invoice showing invoice number, issue date, delivery date of goods and services, due date of the invoice, business address of the Employer and Contractor, their company registration number and TINs. When services are provided into other EU member country, the VAT duty shall be transferred to the Employer. In the case that goods are delivered into other EU member country, the Contractor shall state reference pursuant to which he applies the VAT exemption.

	The invoice shall include also a column marked "Gross" (Price without taxes), a column marked "Taxes" (tax rates and tax) and column marked "Net". The amount to be shown in the column "Gross" is the amount corresponding to the payment milestone and shall be free from any and all taxes, customs duties or other fees or mandatory payments levied by, or in the territory of, the Slovak Republic. The amount to be shown in column "Net" is the amount to be invoiced after deduction of the corresponding amortization rate of the Advance payment. In the column "Taxes" shall be the amount of the all taxes, customs duties or other fees or mandatory payments levied by, or in the territory of, the Slovak Republic. The Bank will only make payments after the original signed copy of the Contract has been returned via the Employer to the Bank and only on submission of original invoices and original supporting receipts. Invoice payments will be made by direct transfer to the bank account specified in the Contract. Full details of the bank account where payment shall be made shall also be stated on the invoices, including currency of the account and SWIFT number (if available). For the purpose of the refunding of the taxes, customs duties levied by, or in the territory of, the Slovak Republic; - the VAT number (VAT registration in Slovak tax office obtained on the basis of the registration of the Contractor in Slovak Republic) should be inscribed on the invoices or the VAT registration number from its country if it is not registered in Slovak Republic and - the Contractor should enclose the relevant documents (invoices, others) demonstrating the amount and payment of the required refunding amount. Number of Invoices: 2 originals and 2 copies b) and c) to be deleted and replaced by: All payments, including refunding amounts, should be made within sixty days of the acceptance by the Employer of the Contractor's valid invoice, with full supporting documentation in accordance with the requirements of the Contract. Notwithstanding, submittal requirements mentioned elsewhere, the following submittals, in the prescribed form/format are prerequisite to payment (other than any approved Advance Payment): - Insurance Certificates and Securities; - Health and Safety Plan; - Programme; - Quality Manual/Planning of quality management system
14.8. Delayed Payment	The first sentence to be replaced by the following: If the Contractor does not receive payment in accordance with Sub-Clause

	14.7, the Contractor shall be entitled to claim a per annum delay interest, from the due unpaid amount for each day of delay pro rata, in the amount of 1% above 1M EURIBOR, divided by number of weeks in the given calendar year, unless the Employer is able to prove that has submitted the invoice to the Bank in accordance with Sub-Clause 2.4.. To be added at the end: For purposes of this Clause 14.8 "1M EURIBOR" means the percentage rate per annum determined by the European Banking Federation for the offering of deposits in Euro for a period of one month, displayed on the appropriate page of the Telerate screen or Reuters screen as of 11.00 a.m. (Bratislava time) on the due date. If no such screen rate is available, 1M EURIBOR shall be the arithmetic mean (rounded downward to four decimal places) of the rates as supplied to the Employer at its request quoted by three reference banks, selected by the Employer, to leading banks in the European interbank market, as of 11.00 a.m. (Bratislava time) on the due date.
14.9 Payment of Retention Money	Not applicable
15.Termination by the Employer	
15.2 Termination by Employer	After item (f) insert: (g) In the judgment of the Employer, the Contractor has engaged in corrupt, fraudulent, coercive or collusive practices in competing for or in the executing of the Contract. For the purpose of this Clause: (i) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party. (ii) "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation. (iii) "coercive practice" means impairing or harming, or threatening to impair or harm, direct or indirectly, any party or the property of the party to influence improperly the actions of a party. (iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party.
17. Risk and Responsibility	
17.1 Indemnities	This clause shall be replaced by the following: Liability for damage that has occurred as a consequence of, or in relation

	to, the Contract shall be governed by the provisions of Section 373 and subsequent sections of the Commercial Code as set forth herein. Therefore, if the Contractor breaches its stipulated Contract obligations, or any applicable legal regulations, and causes the Employer damage the Contractor shall compensate for the damage in compliance with the following principles: (a) The Contractor shall compensate all damages and all costs incurred to the Employer as a consequence of, or in relation with, the failure of the Contractor to comply with his obligations in the Contract or in the applicable legal regulations. (b) Damages shall not include loss of profit. (c) Damages shall include, but (subject to the exclusion in (b) above) not be limited to, damage that occurs as a consequence of, or in relation with: (i) bodily injury, sickness, disease or death of any person whatsoever arising out of, or in the course of, or by reason of the Contractor's design, execution and completion of, the Works and the remedying of any defects. (ii) Damage to, or loss of, any property, which has arisen as a consequence of, or in relation with: - a defect or imperfection of the Contractor's design, the execution and completion of the Works and the remedying of any defects; - breach of an obligation pursuant to this Contract by the Contractor, the Contractor's Personnel or by any other person for whom the Contractor is liable; - a failure to notify a defect or imperfection in the Contractor's design or the Employer's instruction, if the Contractor is responsible for notifying such defect or imperfection pursuant to the Contract. If the Employer breaches any of its stipulated Contract obligations, or any applicable legal regulations, and causes damage to the Contractor, the Employer shall compensate for the damage in compliance with the following principles: (a) Subject to (b), (c) (d) and (e) below, the Employer shall compensate all damages and all costs incurred to the Contractor as a consequence of, or in relation with, the failure of the Employer to comply with his obligations in the Contract or in the applicable legal regulations. (b) Damages shall not include loss of profit. (c) The Employer shall compensate for costs and/or damages only up to a total compensation amount of 100% of the Contract Price. (d) The Employer shall not be obliged to compensate for any damage caused to the Contractor for a delay in the Employer's obligation to pay the

	Contractor on time. Only the provisions of Clause 14.8 shall apply to any such delayed payments, and (e) The Employer shall not be obliged to compensate for any damage that is coved by insurance pursuant to Clause 18.1. The indemnity provisions of this Clause 17.1 shall not apply to Clause 17.5.
17.5 Intellectual and Industrial Property Rights	At the beginning of the Sub-Clause add the following new paragraph: The Intellectual Property Rights in all software shall remain vested in the owner of such rights. Delete the second paragraph. The third paragraph shall be replaced by the following: The Employer hereby gives a promise of indemnity pursuant to Section 725 of the Commercial Code and undertakes to indemnify the Contractor for any evidenced damages or expenses incurred by the Contractor as the result of a third party claim brought against the Contractor in connection with the Contractor discharging its obligations under this agreement and which is or was: (a) an unavoidable result of the Contractor's compliance with the Contract, or (b) a result of any Works being used by the Employer, (i) for a purpose other than that indicated by, or reasonably to be inferred from, the Contract, or (ii) in conjunction with any thing not supplied by the Contractor, unless such use was disclosed to the Contractor prior to the Commencement Date or is stated in the Contract. Such obligation to indemnify shall exist only in the event that the cost, expense or damage to the Contractor has not been caused by wilful misconduct or grossly negligent actions by the Contractor and that the Contractor has diligently defended such claim. For the purposes of this promise of indemnity, the Employer hereby confirms having requested the Contractor to perform the activities set out in this agreement, without the Contractor having been under a prior legal obligation to do so. The Employer shall not be liable to the Contractor for any indirect or consequential damages or loss profit. Fourth paragraph shall be replaced by the following: The Contractor hereby gives a promise of indemnity pursuant to Section 725 of the Commercial Code and undertakes to indemnify the Employer for any evidenced damages or expenses incurred by the Employer as the result of a third party claim brought against the Employer in connection with the Employer discharging its obligations under this agreement and which arises out of or in relation to (i) the manufacture, use, sale or import of any Goods, or (ii) any design for which the Contractor is responsible. Such obligation to indemnify shall exist only in the event that the cost, expense or damage to the Employer has not been caused by wilful

	misconduct or grossly negligent actions by the Employer and that the Employer has diligently defended such claim. For the purposes of this promise of indemnity, the Contractor hereby confirms having requested the Employer to perform the activities set out in this agreement, without the Employer having been under a prior legal obligation to do so. The Contractor shall not be liable to the Employer for any indirect or consequential damages or loss profit. At the beginning of the fifth paragraph add the following: Whenever a Party receives a notice of any claim, it shall give notice to the other Party within 28 days of receiving the claim.
17.7 Nuclear Liability	Add Sub-Clause 17.7: Liability for Nuclear Damage. Nuclear third party liability shall be governed by the provisions of Vienna Convention on Civil Liability for Nuclear Damage of May 21, 1963 and in accordance with act No 541/2004 Coll. of December 1, 2004 of the Slovak Republic on the peaceful use of nuclear energy and on amendments and supplements to certain acts as amended together with Act No. 125/2006 Coll. on State supervision of work safety. All terms used in this clause shall have the same meaning as defined in Vienna Convention on Civil Liability for Nuclear Damage of May 21, 1963, except in case of international acts or omissions.
18. Insurance	
18.1 , 18.2, 18.3, 18.4	Clauses 18.1 to 18.4 to be deleted and replaced with : 18.1. Requirements for Insurances Contractor shall obtain and maintain in full force and effect during the Term of this Contract the insurance described below on terms and conditions approved by the Employer, and shall provide to the Employer certificates evidencing such coverage: (a) Insurance of costs related to implementation of the Works including all materials, salaries, transport expenses, prices, and fees that are subject of the Contract in the course of construction, erection/installation, and testing. The insurance shall include expenses for demolition and for removal of demolition debris and cover also damages resulting from errors in the design, use of defective material and deficiencies in the works performed. (b) Insurance against loss of, and damage to, the property in the possession, use, care or administration of the Employer on the site in the course of construction, erection/installation, and testing of new plants. (c) Insurance against loss of, and damage to, materials and equipment in the course of their transportation to the site. (d) Insurance against loss of, and damage to, the property of the Contractor on the site (construction machinery, equipment, devices,

	tools, etc). (e) The insurance indicated in Items (a) and (b) shall cover all risks of construction and erection/installation including but not limited to risks of fire, flood, storm wind, and earthquake. Assessment of the insured property shall amount to its 100% replacement value. (f) Commercial general insurance and product liability insurance against injury to health or life of the injured person or against damage to things caused by a defective product, and completed works liability insurance against injury to health and/or material damage caused to third parties. The insurance limit shall be the limit for an insured event amounting to no less than the amount specified in Appendix to Tender, Item 18.1. (g) Third party liability insurance against injury to health and/or material damage caused to third parties resulting from construction, erection/installation, and testing on the site (for the limit see Appendix to Tender, Item 18.1). (h) Compulsory third party liability (motor) insurance pursuant to Slovak laws. The periods of submission of insurance are stated in Appendix to Tender Sub-Clause 18.1.
20. Claims, dispute and arbitration	
20.2, 20.3, 20.4, 20.7, 20.8	Clauses 20.2, 20.3, 20.4, 20.7 and, 20.8 to be deleted
20.5.	To be deleted and replaced with the following: "All disputes arising from the execution of or in connection with the Contract shall be first settled through amicable negotiation between the Parties. Each Party must appoint representatives with authority to settle the dispute. Where the Parties are unable to settle a dispute within fifty-six (56) days from the date of receipt by one Party of the written notice from the other Party specifying that a dispute exists and giving details about such a dispute, either Party may refer the dispute to arbitration in accordance with Section 20.6."
20.6. Arbitration	First sentence to be deleted and replaced with: "Disputes, which can not be settled amicably pursuant to section 20.5. shall be finally settled by international arbitration." Delete the text: "The arbitrator(s) shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, and any decision of the DAB, relevant to the dispute. Nothing shall disqualify the Engineer from being called as a witness and giving evidence

	before the arbitrator(s) on any matter whatsoever relevant to the dispute. Neither Party shall be limited in the proceedings before the arbitrator(s) to the evidence nor shall arguments previously put before the DAB to obtain its decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the DAB shall be admissible in evidence in the arbitration. Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Engineer and the DAB shall not be altered by reason of any arbitration being conducted during the progress of the Works." and replace with the text: "The arbitrator(s) shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute. Nothing shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute. Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties and the Engineer shall not be altered by reason of any arbitration being conducted during the progress of the Works. The place of arbitration shall be Bratislava, Slovak Republic. The arbitration shall be governed by the law defined in sub-clause 1.4 (Law and Language). The arbitration decision shall be final and binding upon the Parties. The costs of the arbitration shall be in the discretion of the arbitrators."

BIDSF project D2

DECONTAMINATION OF THE PRIMARY CIRCUIT

F. The General Conditions

Conditions of Contract
for **PLANT and Design-Build**

FOR ELECTRICAL AND MECHANICAL WORKS
AND FOR BUILDING AND ENGINEERING
WORKS DESIGNED BY THE CONTRACTOR

General Conditions

1st Edition 1999

FEDERATION INTERNATIONALE DES INGENIEURS-CONSEILS
INTERNATIONAL FEDERATION OF CONSULTING ENGINEERS
INTERNATIONALE VEREINIGUNG BERATENDER INGENIEURE
FEDERACION INTERNACIONAL DE INGENIEROS CONSOLTORES

General Conditions

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Definitions listed alphabetically

General Conditions

General Provisions

1.1.
Definitions

In the Conditions of Contract ("these Conditions"), which include Particular Conditions and these General Conditions, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

1.1.1
The Contract

1.1.1.1 **"Contract"** means the Contract Agreement, the Letter of Acceptance, the Letter of Tender, these Conditions, the Employer's Requirements, the Schedules, the Contractor's Proposal, and the further documents (if any) which are listed in the Contract Agreement or in the Letter of Acceptance.

1.1.1.2 **"Contract Agreement"** means the contract agreement (if any) referred to in Sub-Clause 1.6 *[Contract Agreement].*

1.1.1.3 **"Letter of Acceptance"** means the letter of formal acceptance, signed by the Employer, of the Letter of Tender, including any annexed memoranda comprising agreements between and signed by both Parties. If there is no such letter of acceptance, the expression "Letter of Acceptance" means the Contract Agreement and the date of issuing or receiving the Letter of Acceptance means the date of signing the Contract Agreement.

1.1.1.4 **"Letter of Tender"** means the document entitled letter of tender, which was completed by the Contractor and includes the signed offer to the Employer for the Works.

1.1.1.5 **"Employer's Requirements"** means the document entitled employer's requirements, as included in the Contract and any additions and modifications to such document in accordance with the Contract Such document specifies the purpose, scope, and/or design and/or other technical criteria, for the Works.

1.1.1.6 **"Schedules"** means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Tender, as included in the Contract. Such document may include data lists and schedules of payments and/or prices.

1.1.1.7 **"Contractor's Proposal"** means the document entitled proposal, which the Contractor and submitted with the Letter of Tender, as included in the Contract. Such document may include the Contractor's preliminary design.

1.1.1.8 **"Tender"** means the Letter of Tender and all other documents witch the Contractor submitted with the Letter of Tender, as included in the Contract.

1.1.1.9 **“Appendix to Tender"** means the completed pages entitled appendix to tender which are appended to and form part of the Letter of Tender.

1.1.2
Parties and Persons

1.1.1.10 **"Schedule of Guarantees"** and **"Schedule of Payments"** mean the documents so named (if any) which are comprised in the Schedules.

1.1.2.1 **"Party"** means the Employer or the Contractor, as the context requires.

1.1.2.2 **"Employer"** means the person named as employer in the Appendix to Tender and the legal successors in title to this person.

1.1.2.3 **"Contractor"** means the person(s) named as contractor in the Letter of Tender accepted by the Employer and the legal successors in title to this person(s).

1.1.2.4 **"Engineer"** means the person appointed by the Employer to act as the Engineer for the purposes of the Contract and named in the Appendix to Tender, or other person appointed from time to time by the Employer and notified to the Contractor under Sub-Clause 3.4 *[Replacement of the Engineer].*

1.1.2.5 **"Contractor's Representative"** means the person named by the Contractor in the Contract or appointed from time to time by the Contractor under Sub-Clause 4.3 *[Contractor's Representative],* who acts on behalf of the Contractor.

1.1.2.6 **"Employer's Personnel"** means the Engineer, the assistants referred to in Sub-Clause 3.2 *[Delegation by the Engineer]* and all other staff, labour and other employees of the Engineer and of the Employer; and any other personnel notified to the Contractor, by the Employer or the Engineer, as Employer's Personnel.

1.1.2.7 **"Contractor's Personnel"** means the Contractor's Representative and all personnel whom the Contractor utilises on Site, who may include the staff, labour and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the Works.

1.1.2.8 **"Subcontractor"** means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works; and the legal successors in title to each of these persons.

1.1.2.9 **"DAB"** means the person or three persons so named in the Contract or other person(s) appointed under Sub-Clause 20.2 *[Appointment of the Dispute Adjudication Board]* or Sub-Clause 20.3 *[Failure to Agree Dispute Adjudication Board].*

1.1.2.10 **"FIDIC"** means the Fédération Internationale des Ingénieurs-Conseils, the international federation of consulting engineers.

1.1.3

Dates, Tests, Periods and Completion

1.1.3.1 **"Base Date"** means the date 28 days prior to the latest date for submission of the Tender.

1.1.3.2 **"Commencement Date"** means the date notified under Sub-Clause 8.1 *[Commencement of Works].*

1.1.3.3 **"Time for Completion"** means the time for completing the Works or a Section (as the case may be) under Sub-Clause 8.2 *[Time for Completion]*, as stated in the Appendix to Tender (with any extension under Sub-Clause

8.4 *[Extension of Time for Completion]),* calculated from the Commencement Date.

1.1.3.4 **"Tests on Completion"** means the tests which are specified in the Contract or agreed by both Parties or instructed as a Variation, and which are carried out under Clause 9 *[Tests on Completion]* before the Works or a Section (as the case may be) are taken over by the Employer.

1.1.3.5 **"Taking-Over Certificate"** means a certificate issued under Clause 10 *[Employer's Taking Over].*

1.1.3.6 **"Tests after Completion"** means the tests (if any) which are specified in the Contract and which are carried out under Clause 12 *[Tests after Completion]* after the Works or a Section (as the case may be) are taken over by the Employer.

1.1.3.7 **"Defects Notification Period"** means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 11.1 *[Completion of Outstanding Work and Remedying Defects],* as stated in the Appendix to Tender (with any extension under Sub-Clause 11.3 *[Extension of Defects Notification Period]),* calculated from the date on which the Works or Section is completed as certified under Sub-Clause 10.1 *[Taking Over of the Works and Sections].*

1.1.3.8 **"Performance Certificate"** means the certificate issued under Sub-Clause 11.9 *[Performance Certificate].*

1.1.3.9 **"day"** means a calendar day and **"year"** means 365 days.

1.1.4

Money and Payments

1.1.4.1 **"Accepted Contract Amount"** means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.

1.1.4.2 **"Contract Price"** means the price defined in Sub-Clause 14.1 *[The Contract Price],* and includes adjustments in accordance with the Contract.

1.1.4.3 **"Cost"** means all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.

1.1.4.4 **"Final Payment Certificate"** means the payment certificate issued under Sub-Clause 14.13 *[Issue of Final Payment Certificate].*

1.1.4.5 **"Final Statement"** means the statement defined in Sub-Clause 14.11 *[Application for Final Payment Certificate].*

1.1.4.6 **"Foreign Currency"** means a currency in which part (or all) of the Contract Price is payable, but not the Local Currency.

1.1.4.7 **"Interim Payment Certificate"** means a payment certificate issued under Clause 14 *[Contract Price and Payment],* other than the Final Payment Certificate.

1.1.4.8 **"Local Currency"** means the currency of the Country.

1.1.4.9 **"Payment Certificate"** means a payment certificate issued under Clause 14 *[Contract Price and Payment].*

1.1.4.10 **"Provisional Sum"** means a sum (if any) which is specified in the Contract as a provisional sum, for the execution of any part of the Works or for the supply of Plant, Materials or services under Sub-Clause 13.5 *[Provisional Sums].*

1.1.4.11 **"Retention Money"** means the accumulated retention moneys which the Employer retains under Sub-Clause 14.3 *[Application for Interim Payment Certificates]* and pays under Sub-Clause 14.9 *[Payment of Retention Money].*

1.1.4.12 **"Statement"** means a statement submitted by the Contractor as part of an application, under Clause 14 *[Contract Price and Payment],* for a payment certificate.

1.1.5
Works and Goods

1.1.5.1 **"Contractor's Equipment"** means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor's Equipment excludes Temporary Works, Employer's Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.

1.1.5.2 **"Goods"** means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.

1.1.5.3 **"Materials"** means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.

1.1.5.4 **"Permanent Works"** means the permanent works to be executed by the Contractor under the Contract.

1.1.5.5 **"Plant"** means the apparatus, machinery and vehicles intended to form or forming part of the Permanent Works.

1.1.5.6 **"Section"** means a part of the Works specified in the Appendix to Tender as a Section (if any).

1.1.5.7 **"Temporary Works"** means all temporary works of every kind (other than Contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

1.1.5.8 **"Works"** mean the Permanent Works and the Temporary Works, or either of them as appropriate.

1.1.6
Other Definitions

1.1.6.1 **"Contractor's Documents"** means the calculations, computer programs and other software, drawinqs manuals models and other document of a technical nature (if any) supplied by the Contractor under the Contract; as described in Sub-Clause 5.2 *[Contractor's Documents].*

1.1.6.2 **"Country"** means the country in which the Site (or most of it) is located where the Permanent Works are to be executed.

1.1.6.3 **"Employer's Equipment"** means the apparatus, machinery and vehicles (if any) made available by the Employer for the use of the Contractor in the execution of the Works, as stated in the Employer's Requirements; but does not include Plant which has not been taken over by the Employer.

1.1.6.4 **"Force Majeure"** is defined In Clause 19 *[Force Majeure].*

1.1.6.5 **"Laws"** means all national (or state) legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority.

1.1.6.6 **"Performance Security"** means the security (or securities, if any) under Sub-Clause 4.2 *[Performance Security].*

1.1.6.7 **"Site"** means the places where the Permanent Works are to be executed and to which Plant and Materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.

1.1.6.8 **"Unforeseeable"** means not reasonably foreseeable by an experienced contractor by the date for submission of the Tender.

1.1.6.9 **"Variation"** means any change to the Employer's Requirements or the Works, which is instructed or approved as a variation under Clause 13 *[Variations and Adjustments].*

1.2.

Interpretation

In the Contract, except where the context requires otherwise:

(a) words indicating one gender include all genders;
(b) words indicating the singular also include the plural and words indicating the plural also include the singular;
(c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing, and
(d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

The marginal words and other headings shall not be taken into consideration in the Interpretation of these Conditions.

1.3

Communications

Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be:

(a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Appendix to Tender; and
(b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Appendix to Tender. However:

(i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and
(ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued.

Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Engineer or the other Party, as the case may be.

1.4

Land and Language

The Contract shall be governed by the law of the country (or other jurisdiction) stated in the Appendix to Tender.

If there are versions of any part of the Contract which are written in more than one language, the version which is in the ruling language stated in the Appendix to Tender shall prevail.

The language for communications shall be that stated in the Appendix to Tender. If no language is stated there, the language for communications shall be the language in which the Contract (or most of it) is written.

1.5

Priority of Documents

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

(a) the Contract Agreement (if any),
(b) the Letter of Acceptance,
(c) the Letter of Tender,
(d) the Particular Conditions,
(e) these general Conditions,
(f) the Employer´s Requirements,
(g) the Schedules, and
(h) the Contractor´s Proposal and any other documents forming part of the Contract.

If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.

1.6

Contract Agreement

The Parties shall enter into a Contract Agreement within 28 days after the Contractor receives the Letter of Acceptance, unless they agree otherwise. The Contract Agreement shall be based upon the form annexed to the Particular Conditions. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Employer.

1.7

Assignement

Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract. However, either Party:

(a) may assign the whole or any part with the prior agreement of the other Party, at the sole discretion of such other Party, and
(b) may, as security in favour of a bank or financial institution, assign its right to any moneys due, or to become due, under the Contract.

1.8

Care and Supply of Documents

Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Engineer six copies of each of the Contractor's Documents.

The Contractor shall keep, on the Site a copy of the Contract, publications named in the Employer's Requirements, the Contractor's Documents and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

1.9

If a Party becomes aware of an error or defect of technical nature in a document which was prepared for use executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

Errors in the Employer´s Requiremens

If the Contractor suffers delay and/or incurs Cost as a result of an error in the Employer's Requirements, and an experienced contractor exercising due care would not have discovered the error when scrutinising the Employer's Requirements under Sub-Clause 5.1 *[General Design Obligations],* the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 *[Extension of Time for Completion],* and
(b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been so discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

1.10

Epmloyer´s Use of Contractor´s Documents

As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor.

The Contractor shall be deemed (by signing the Contract) to give to the Employer a non-terminable transferable non-exclusive royalty-free licence to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This licence shall:

(a) apply throughout the actual or itended working life (whichever is longer) of the relevant parts of the Works,
(b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
(c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent be used, copied or communicated to a third party by (or on behalf of) the Employer for purposes other than those permitted under this Sub-Clause.

1.11

Contrator´s Use of Employer´s Documents

As between the Parties, the Employer shall retain the copyright and other intellectual property rights In the Employer's Requirements and other documents made by (or on behalf of) the Employer. The Contractor may at his cost copy, use, and obtain communication of these documents for the purposes; of the Contract. They shall not, without the Employer's consent, be copied used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

1.12

Confidential Details

The Contractor shall disclose all such confidential and other information as the Engineer may reasonably require in order to verify the Contractor's compliance with the Contract.

1.13
Compliance with Laws

The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise stated in the Particular Conditions:

(a) the Employer shall have obtained (or shall obtain) the planning, zoning or similar permission for the Permanent Works, and any other permissions described in the Employer's Requirements as having been (or being) obtained by the Employer; and the Employer shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so; and

(b) the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licences and approvals, as required by the Laws in relation to the design, execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so.

1.14

Joint Several Liability

If the Contractor constitutes (under applicable Laws) a joint venture, consortium or other unincorporated grouping of two or more persons:

(a) these persons shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract;

(b) these persons shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons; and

(c) the Contractor shall not alter its composition or legal status without the prior consent of the Employer.

The Employer

2.1

Right of Access to the Site

The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated In the Appendix to Tender. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Employer's Requirements. However, the Employer may withhold any such right or possession until the Performance Security has been received.

If no such time is stated in the Appendix to Tender, the Employer shall give the Contractor right of access to, and possession of, the Site within such times as may be required to enable the Contractor to proceed in accordance with the programme submitted under Sub-Clause 8.3 *[Programme].*

If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 *[Extension of Time for Completion],* and ,

(b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After, receiving this notice, the Engineer shall proceed in accordance with Sub-Clause *3.5 [Determinations]* to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

2.2

Peermints, Licences or Approvals

The Employer shall (where he is in a position to do so) provide reasonable assistance to the Contractor at the request of the Contractor:

(a) by obtaining copies of the Laws of the Country which are relevant to the Contract but are not readily available, and

(b) for the Contractor's applications for any permits, licences or approvals required by the Laws of the Country:

(i) which the Contractor is required to obtain under Sub-Clause 1.13 *[Compliance with Laws],*

(ii) for the delivery of Goods, including clearance through customs, and

(iii) for the export of Contractor's Equipment when it is removed from the Site.

2.3

Employer´s Personnel

The Employer shall be responsible for ensuring that the Employer's Personnel and the Employer' s other contractors on the Site:

(a) co-operate with the Contractor's efforts under Sub-Clause 4.6 *[Co-operation],* and

(b) take actions similar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) of Sub-Clause 4.8 *[Safety Procedures]* and under Sub-Clause 4.18 *[Protection of the Environment].*

2.4

Employer´s Financial Arrangements

The Employer shall submit, within 28 days after receiving any request from the Contractor, reasonable evidence that financial arrangements have been made and are being maintained which will enable the Employer to pay the Contract Price (as estimated at that time) in accordance with Clause 14 *[Contract Price and Payment].* If the Employer intends to make any material change to his financial arrangements, the Employer shall give notice to the Contractor with detailed particulars.

2.5

Emloyer´s Claims

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, the Employer or the Engineer shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 *[Electricity, Water and Gas],* under Sub-Clause 4.20 *[Employer's Equipment and Free-Issue Material],* or for other services requested by the Contractor.

The notice shall be given as soon as practicable after the Employer became aware of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract. The Engineer shall then proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine (i) the amount (if any) which the Employer is entitled to be paid by the Contractor,

and/or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 *[Extension of Defects Notification Period].*

This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause.

The Engineer

3.1
Engineer's Duties and Authority

The Employer shall appoint the Engineer who shall carry out the duties assigned to him in the Contract. The Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

The Engineer shall have no authority to amend the Contract.

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. If the Engineer is required to obtain the approval of the Employer before exercising a specified authority, the requirements shall be as stated in the Particular Conditions. The Employer undertakes not to impose further constraints on the Engineer's authority, except as agreed with the Contractor.

However, whenever the Engineer exercises a specified authority for which the Employer's approval is required, then (for the purposes of the Contract) the Employer shall be deemed to have given approval.

Except as otherwise stated in these Conditions:

(a) whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Engineer shall be deemed to act for the Employer;
(b) the Engineer has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract; and
(c) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

3.2
Delegation by the Engineer

The Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, and/or independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. However, unless otherwise agreed by both Parties, the Engineer shall not delegate the authority to determine any matter in accordance with Sub-Clause 3.5 *[Determinations].*

Assistants shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority, and who are fluent in the language for communications defined in Sub-Clause 1.4 [*Law and Language*].

Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorised to issue instructions to the Contractor to the extent defined

by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as thought the act had been an act the Engineer. However:

(a) any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Engineer to reject the work, Plant or Materials;

(b) if the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction.

3.3

Instructions of the Engineer

The Engineer may issue to the Contractor (at any time) instructions which may be necessary for the execution of the Works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Engineer, or from an assistant to whom the appropriate authority has been delegated under this Clause. If an instruction constitutes a Variation, Clause 13 *[Variations and Adjustments]* shall apply.

The contractor shall comply with the instructions given by the Engineer or delegated assistant, on any matter related to the Contract. These instructions shall be given in writing.

3.4

Replacement of the Engineer

If the Employer intends to replace the Engineer, the Employer shall, not less than 42 days before the intended date of replacement, give notice to the Contractor of the name, address and relevant experience of the intended replacement Engineer. The Employer shall not replace the Engineer with a person against whom the Contractor raises reasonable objection by notice to the Employer, with supporting particulars.

3.5

Determinations

Whenever these Conditions provide that the Engineer shall proceed in accordance with this Sub-Clause 3.5 to agree or determine any matter, the Engineer shall consult with each Party in an endeavour to reach agreement. If agreement is not achieved, the Engineer shall make a fair determination in accordance with the Contract taking due regard of all relevant circumstances.

The Engineer shall give notice to both Parties of each agreement or determination with supporting particulars. Each Party shall give effect to each agreement or determination unless and until revised under Clause 20 *[Claims Disputes and Arbitration].*

The Contractor

4.1

Contractor´s General Obligations

The Contractor shall design, execute and complete the Works in accordance with the Contract, and shall remedy any defects in the Works. When completed, the Works shall be fit for the purposes for which the Works are intended as defined in the Contract.

The Contractor shall provide the Plant and Contractor´s Documents specified in the Contract and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for this design, execution, completion and remedying of defects.

The Works shall include any work which is necessary to satisfy the Employer's Requirements, Contractor's Proposal and Schedules, or is implied by the Contract, and all works which (although not mentioned in the Contract) are necessary for stability or for the completion, or safe and proper operation, of the Works.

The Contractor shall be responsible for the adequacy, stability and safety of all Site operations, of all methods of construction and of all the Works.

The Contractor shall, whenever required by the Engineer, submit details of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Engineer.

4.2

Performance Security

The Contractor shall obtain (at his cost) a Performance Security for proper performance in the amount and currencies stated in the Appendix to Tender. If an amount is not stated in the Appendix to Tender, this Sub-Clause shall not apply.

The Contractor shall deliver the Performance Security to the Employer within 28 days after receiving the Letter of Acceptance, and shall send a copy to the Engineer. The Performance Security shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract in the event of:

(a) failure by the Contractor to extend the validity of the Performance Security as described in the preceding paragraph, in which event the Employer may claim the full amount of the Performance Security,

(b) failure by the Contractor to pay the Employer an amount due, as either agreed by the Contractor or determined under Sub-Clause 2.5 *[Employer's Claims]* or Clause 20 *[Claims, Disputes and Arbitration],* within 42 days after this agreement or determination,

(c) failure by the Contractor to remedy a default within 42 days after receiving the Employer's notice requiring the default to be remedied, or

(d) circumstances which entitle the Employer to termination under Sub-Clause 15.2 *[Termination by Employer],* irrespective of whether notice of termination has been given.

The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses (resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim.

The Employer shall return the Performance Security to the Contractor within 21 days after receiving a copy of the Performance Certificate.

4.3 Contractor´s Representative

The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Engineer for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked, or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint a replacement.

The whole time of the Contractor's Representative shall be given to directing the Contractor's performance of the Contract. If the Contractor's Representative is to be temporarily absent from the Site during the execution of the Works, a suitable replacement person shall be appointed, subject to the Engineer's prior consent, and the Engineer shall be notified accordingly.

The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.3 *[Instructions of the Engineer].*

The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Engineer has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

The Contractor's Representative and all these persons shall be fluent in the language for communications defined in Sub-Clause 1.4 *[Law and Language].*

4.4

Subcontractors

The Contractor shall not subcontract the whole of the Works.

The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor. Unless otherwise stated in the Particular Conditions:

(a) the Contractor shall not be required to obtain consent to suppliers of Materials, or to a subcontract for which the Subcontractor is named in the Contract;
(b) the prior consent of the Engineer shall be obtained to other proposed Subcontractors; and
(c) the Contractor shall give the Engineer not less than 28 day´s notice of the intended date of the commencement of each Subcontractor´s work, and of the commencement of such work on the Site.

4.5

Nominated Subcontractors

In this Sub-Clause, "nominated Subcontractor" means a Subcontractor whom the Engineer, under Clause 13 *[Variations and Adjustments],* instructs the Contractor to employ as a Subcontractor. The Contractor shall not be under any obligation to employ a nominated Subcontractor against whom the Contractor raises reasonable objection by notice to the Engineer as soon as practicable, with supporting particulars.

4.6

Co-operation

The Contractor shall, as specified in the Contract or as instructed by the Engineer, allow appropriate opportunities for carrying out work to:

(a) the Employer's Personnel,
(b) any other contractors employed by the Employer, and
(c) the personnel of any legally constituted public authorities,

who may be employed in the execution on or near the Site of any work not included in the Contract.

Any such instruction shall constitute a Variation if and to the extent that it causes the Contractor to incur Unforeseeable Cost. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements which are the responsibility of the Contractor.

The Contractor shall be responsible for his construction activities on the Site, and shall co-ordinate his own activities with those of other contractors to the extent (if any) specified in the Employer's Requirements.

If, under the Contract, the Employer is required to give to the Contractor possession of any foundation, structure, plant or means of access in accordance with Contractor's Documents, the Contractor shall submit such documents to the Engineer in the time and manner stated in the Employer's Requirements.

4.7

Setting Out

The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract or notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

The Employer shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in these items of reference, and an experienced contractor could not reasonably have discovered such error and avoided this delay and/or Cost, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 *[Extension of Time for Completion]*, and
(b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

4.8

Safety Procedures

The Contractor shall:

(a) comply with all applicable safety regulations,
(b) take care for the safety of all persons entitled to be on the Site,
(c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons,
(d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause10 *[Employer's Taking Over)*,and

(e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

4.9

Quality Assurance

The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Engineer shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Engineer for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Engineer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

4.10

Site Data

The Employer shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Employer's possession on sub-surface and hydrological conditions at the Site, including environmental aspects. The Employer shall similarly make available to the Contractor all such data which come into the Employer's possession after the Base Date. The Contractor shall be responsible for interpreting all such data.

To the extent which was practicable (taking account of cost and time), the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

(a) the form and nature of the Site, including sub-surface conditions,
(b) the hydrological and climatic conditions,
(c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,
(d) the Laws, procedures and labour practices of the Country, and
(e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

4.11

Sufficiency of the Accepted Contract Amount

The Contractor shall be deemed to:

(a) have satisfied himself as to the correctness and sufficiency of the Accepted Contract Amount, and
(b) have based the Accepted Contract Amount on the data, interpretations, necessary information, inspections, examinations and satisfaction as to all relevant matters referred to in Sub-Clause 4.10 *[Site Data]* and any further data relevant to the Contractor's design.

Unless otherwise stated in the Contract, the Accepted Contract Amount covers all the Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things necessary for the proper design, execution and completion of the Works and the remedying of any defects.

4.12

Unforeseeabl Physical Conditions

In this Sub-Clause, "physical conditions" means natural physical conditions and man-made and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-surface and hydrological conditions but excluding climatic conditions.

If the Contractor encounters adverse physical conditions which he considers to have been Unforeseeable, the Contractor shall give notice to the Engineer as soon as practicable.

This notice shall describe the physical conditions, so that they can be inspected by the Engineer, and shall set out the reasons why the Contractor considers them to be Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions which the Engineer may give. If an instruction constitutes a Variation, Clause 13 *[Variations and Adjustments]* shall apply.

If and to the extent that the Contractor encounters physical conditions which are Unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 *[Extension of Time for Completion],* and
(b) payment of any such Cost, which shall be included in the Contract Price.

After receiving such notice and inspecting and/or investigating these physical conditions, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine (i) whether and (If so) to what extent these physical conditions were Unforeseeable, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

However, before additional Cost is finally agreed or determined under sub-paragraph (ii), the Engineer may also review whether other physical conditions in similar parts of the Works (if any) were more favourable than could reasonably have been foreseen when the Contractor submitted the Tender. If and to the extent that these more favourable conditions were encountered, the Engineer may proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates. However, the net effect of all adjustments under sub-paragraph (b) and all these reductions, for all the physical conditions encountered in similar parts of the Works, shall not result in a net reduction in the Contract Price.

The Engineer may take account of any evidence of the physical conditions foreseen by the Contractor when submitting the Tender, which may be made available by the Contractor, but shall not be bound by any such evidence.

4.13

Rights of Way and Facilities

The Contractor shall bear all costs and charges for special and/or temporary rights-of-way which he may require, including those for access to the Site. The Contractor shall also obtain, at his risk and cost, any additional facilities outside the Site which he may require for the purposes of the Works.

4.14

Avoidence of Interfedence

The Contractor shall not interfere unnecessarily or improperly with:

(a) the convenience of the public, or

(b) the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others.

The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

4.15

Access Route

The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor´s traffic or by the Contractor´s Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

Except as otherwise stated in these Conditions:

(a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes;
(b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions;
(c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route,
(d) the Employer does not guarantee the suitability or availability of particular access routes, and
(d) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

4.16

Transport of Goods

Unless otherwise stated in the Particular Conditions:

(a) the Contractor shall give the Engineer not less than 21 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;
(b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and
(c) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.

4.17

Contractor´s Equipment

The Contractor shall be responsible for all Contractor´s Equipment. When brought on to the Site, Contractor´s Equipment shall be deemed to be exclusively intended for the execution of the work. The Contractor shall not remove from the Site any major items of Contractor´s Equipment without the consent of the Engineer. However, consent shall not be required for vehicles transporting Goods or Contractor´s Personnel off Site.

4.18

Protection of the Environment

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values indicated in the Employer's Requirements, and shall not exceed the values prescribed by applicable Laws.

4.19
Electricity, Water and Gas

The Contractor shall, except as stated below, be responsible for the provision of all power, water and other services he may require.

The Contractor shall be entitled to use for the purposes of the Works such supplies of electricity, water, gas and other services as may be available on the Site and of which details and prices are given in the Employer's Requirements. The Contractor shall, at his risk and cost, provide any apparatus necessary for his use of these services and for measuring the quantities consumed.

The quantities consumed and the amounts due (at these prices) for such services shall be agreed or determined by the Engineer in accordance with Sub-Clause 2.5 *[Employer´s Claims]* and Sub-Clause *[Determinations]*. The Contractor shall pay these amounts to the Employer.

4.20

Empoloyer´s Equipment and Free-Issue Material

The Employer shall make the Employer´s Equipment (if any) available for the use of the Contractor in the execution of the Works in accordance with the details, arrangements and prices stated in the Employer´s Requirements. Unless otherwise stated in the Employer´s Requirements:

(a) the Employer shall be responsible for the Employer's Equipment except that

(b) the Contractor shall be responsible for each item of Employer's Equipment whilst any of the Contractor's Personnel is operating it, driving it, directing it or in possession or control of it.

The appropriate quantities and the amounts due (at such stated prices) for the use of Employer's Equipment shall be agreed or determined by the Engineer in accordance with Sub-Clause 2.5 *[Employer's Claims]* and Sub-Clause 3.5 *[Determinations].* The Contractor shall pay these amounts to the Employer.

The Employer shall supply, free of charge, the "free-issue materials" (if any) in accordance with the details stated in the Employer's Requirements. The Employer shall, at his risk and cost, provide these materials at the time and place specified in the Contract. The Contractor shall then visually inspect them, and shall promptly give notice to the Engineer of any shortage, defect or default in these materials. Unless otherwise agreed by both Parties, the Employer shall immediately rectify the notified shortage, defect or default.

After this visual inspection, the free-issue materials shall come under the care, custody and control of the Contractor. The Contractor's obligations of inspection, care, custody and control shall not relieve the Employer of liability for any shortage, defect or default not apparent from a visual inspection.

4.21

Progress Reports

Unless otherwise stated in the Particular Conditions monthly progress reports shall be prepared by the Contractor and submitted to the Engineer in six copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed oil work which is known to-be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

Each report shall include:

(a) charts and detailed descriptions of progress, including each stage of design, Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection, testing, commissioning and trial operation;

(b) photographs showing the status of manufacture and of progress on the Site;

(c) for the manufacture of each main Item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of:

  (i) commencement of manufacture,
  (ii) Contractor's inspections,
  (iii) tests, and
  (iv) shipment and arrival at the Site;

(d) the details described in Sub-Clause 6.10 *[Records of Contractor's Personnel and Equipment];*

(e) copies of quality assurance documents, test results and certificates of Materials;

(f) list of Variations, notices given under Sub-Clause 2.5 *[Employer's Claims]* and notices given under Sub-Clause 20.1 *[Contractor's Claims];*

(g) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and

(h) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardise the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

4.22

Security of the Site

Unless otherwise stated in the Particular Conditions:

(a) the Contractor shall be responsible for keeping unauthorised persons off the Site, and

(b) authorised persons shall be limited to the Contractor's Personnel and the Employer's Personnel; and to any other personnel notified to the Contractor, by the Employer or the Engineer, as authorised personnel of the Employer's other contractors on the Site.

4.23

Contractor´s Operations on Site

The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Engineer as working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land.

During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required.

Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects notification Period, such Goods as are required for the Contractor to fulfill obliqations under the Contract.

4.24 Fossils

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractors Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 *[Extension of Time for Completion],* and
(b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

Design

5.1 General Design Obligations

The Contractor shall carry out, and be responsible for, the design of the Works. Design shall be prepared by qualified designers who are engineers or other professionals who comply with the criteria (if any) stated in the Employer's Requirements. Unless otherwise stated in the Contract, the Contractor shall submit to the Engineer for consent the name and particulars of each proposed designer and design Subcontractor.

The Contractor warrants that he, his designers and design Subcontractors have the experience and capability necessary for the design. The Contractor undertakes that the designers shall be available to attend discussions with the Engineer at all reasonable times, until the expiry date of the relevant Defects Notification Period.

Upon receiving notice under Sub-Clause 8.1 *[Commencement of Works],* the Contractor shall scrutinise the Employer's Requirements (including design criteria and calculations, if any) and the items of reference mentioned in Sub-Clause 4.7 *[Setting Out].* Within the period stated in the Appendix to Tender, calculated from the Commencement Date, the Contractor shall give notice to the Engineer of any error, fault or other defect found in the Employer's Requirements or these items of reference.

After receiving this notice, the Engineer shall determine whether Clause 13 *[Variations and Adjustments]* shall be applied, and shall give notice to the Contractor accordingly. If and to the extent that (taking account of cost and time) an experienced contractor exercising due care would have discovered the error, fault or other defect when examining the Site and the Employer's Requirements before submitting the Tender, the Time for Completion shall not be extended and the Contract Price shall not be adjusted.

5.2 Contractor´s Documents

The Contractor´s Documents shall comprise the technical documents specified in the Employer´s Requirements, documents required to satisfy all regulatory approvals, and the documents described in Sub-Clause 5.6 *[As-Built Documents]* and Sub-Clause 5.7 *[Operation and Maintenance Manuals]*. Unless otherwise stated in the Employer´s Requirements, the Contractor´s Documents shall be written in the language for communications defined in Sub-Clause 1.4 *[Law and Language]*.

The Contractor shall prepare all Contractor's Documents, and shall also prepare any other documents necessary to instruct the Contractor's Personnel. The Employer's Personnel shall have the right to inspect the preparation of all these documents, wherever they are being prepared.

If the Employer's Requirements describe the Contractor's Documents which are to be submitted to the Engineer for review and/or for approval, they shall be submitted accordingly, together with a notice as described below. In the following provisions of this Sub-Clause, (i) "review period" means the period required by the Engineer for review and (if so specified) for approval, and (ii) "Contractor's Documents" exclude any documents which are not specified as being required to be submitted for review and/or for approval.

Unless otherwise stated in the Employer's Requirements, each review period shall not exceed 21 days, calculated from the date on which the Engineer receives a Contractor's Document and the Contractor's notice. This notice shall state that the Contractor's Document is considered ready, both for review (and approval, if so specified) in accordance with this Sub-Clause and for use. The notice shall also state that the Contractor's Document complies with the Contract, or the extent to which it does not comply.

The Engineer may, within the review period, give notice to the Contractor that a Contractor's Document fails (to the extent stated) to comply with the Contract. If a Contractor's Document so fails to comply, it shall be rectified, resubmitted and reviewed (and, if specified, approved) in accordance with this Sub-Clause at the Contractor's cost.

For each part of the Works, and except to the extent that the prior approval or consent of the Engineer shall have been obtained:

(a) in the case of a Contractor's Document which has (as specified) been submitted for the Engineer's approval:

  (i) the Engineer shall give notice to the Contractor that the Contractor's Document is approved, with or without comments, or that it fails (to the extent stated) to comply with the Contract;
  (ii) execution of such part of the Works shall not commence until the Engineer has approved the Contractor's Document; and
  (iii) the Engineer shall be deemed to have approved the Contractor's Document upon the expiry of the review periods for all the Contractor's Documents which are relevant to the design and execution of such part, unless the Engineer has previously notified otherwise in accordance with sub-paragraph (i);

(b) execution of such part the Works shall not commence prior to the expiry of the review periods for all the Contractor´s Documents which are relevant to its design and execution;
(c) execution of such part of the Works shall be in accordance with these reviewed (and, if specified, approved) Contractor´s Documents; and
(d) if the Contractor wishes to modify any design or document which has previously been submitted for review (and if specified approval) the Contractor shall immediately give notice to the Engineer. Thereafter, the Contractor shall submit revised documents to the Engineer in accordance with the above procedure.

If the Engineer instructs that further Contractor´s Documents are required, the Contractor shall prepare them promptly.

Any such approval or consent, or any review (under this Sub-Clause or otherwise), shall not relieve the Contractor from any obligation or responsibility.

5.3

Contractor´s Undertaking

The Contractor undertakes that the design, the Contractor´s Documents, the execution and the completed Works will be in accordance with:

(a) the Laws in the Country, and
(b) the documents forming the Contract, as altered or modified by Variations.

5.4

Technical Standards and Regulations

The design, the Contractor´s Documents, the execution and the completed Works shall comply with the Country´s technical standards, building, construction and environmental Laws, Laws applicable to the product being produced from the Works, and other standards specified in the Employer´s Requirements, applicable to the Works, or defined by the applicable Laws.

All these Laws shall, in respect of the Works and each Section, be those prevailing when the Works or Section are taken over by the Employer under Clause 10 *[Employer's Taking Over].* References in the Contract to published standards shall be understood to be references to the edition applicable on the Base Date, unless stated otherwise.

If changed or new applicable standards come into force In the Country after the Base Date, the Contractor shall give notice to the Engineer and (if appropriate) submit proposals for compliance. In the event that:

(a) the Engineer determines that compliance is required, and
(b) the proposals for compliance constitute a variation,

then the Engineer shall initiate a Variation in accordance with Clause 13 *[Variations and Adjustments].*

5.5

Training

The Contractor shall carry out the training of Employer's Personnel in the operation and maintenance of the Works to the extent specified in the Employer's Requirements. If the Contract specifies training which is to be carried out before taking-over, the Works shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 *[Taking Over of the Works and Sections]* until this training has been completed.

5.6

As-Built Documents

The Contractor shall prepare, and keep up-to-date, a complete set of “as-built” records of the execution of the Works, showing the exact as-built locations, sizes and details of the work as executed. These records shall be kept on the Site and shall be used exclusively for the purposes of this Sub-Clause. Two copies shall be supplied to the Engineer prior the commencement of the Tests on Completion.

In addition, the Contractor shall supply to the Engineer as-built drawings of the Works, showing all Works as executed, and submit them to the Engineer for review under Sub-Clause 5.2 *[Contractor's Documents].* The Contractor shall obtain the consent of the Engineer as to their size, the referencing system, and other relevant details.

Prior to the issue of any Taking-Over Certificate, the Contractor shall supply to the Engineer the specified numbers and types of copies of the relevant as-built drawings, in accordance with the Employer's Requirements. The Works shall not be considered

to be completed for the purposes of taking-over under Sub-Clause 10.1 *[Taking Over of the Works and Sections]* until the Engineer has received these documents.

5.7

Operation and Maintenance Manuals

Prior to commencement of the Test on Completion, the Contractor shall supply to the Engineer provisional operation and maintenance manuals in sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair the Plant.

The Works shall not be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 *[Taking Over of the Works and Sections]* until the Engineer has received final operation and maintenance manuals in such detail, and any other manuals specified in the Employer's Requirements for these purposes.

5.8

Desing Error

If errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the Contractor's Documents, they and the Works shall be corrected at the Contractor's cost, notwithstanding any consent or approval under this Clause

Staff and Labour

6.1

Engagement of Staff and Labour

Except as otherwise stated in the Employer's Requirements, the Contractor shall make arrangements for the engagement of all staff and labour, local or otherwise, and for their payment, housing, feeding and transport.

6.2

Rates of Wages and Conditions of Labour

The Contractor shall pay rates of wages, and observe conditions of labour, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.

6.3

Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.

6.4

Labour Laws

The Contractor shall comply with all the relevant labour Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.

The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

6.5

Working Hours

No work shall be carried out on the Site on locally recognised days of rest, or outside the normal working hours stated in the Appendix to Tender, unless:

(a) otherwise stated in the Contract,
(b) the Engineer gives consent or,
(c) the work is unavoidable or necessary for the protection of life or property or the safety of the Works, in which case the Contractor shall immediately advise the Engineer.

6.6
Facilities for Staff And Labour

Except as otherwise stated in the Employer's Requirements, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Employer's Requirements.

The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

6.7

Health and Safety

The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

The Contractor shall appoint an accident prevention officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

6.8

Contractor´s Superintendence

Throughout the design and execution of the Works, and as long thereafter as is necessary to fulfill the Contractor's obligations, the Contractor shall provide all necessary superintendence to plan, arrange, direct, manage, inspect and test the work.

Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications (defined in Sub-Clause 1.4 [*Law and Language*]*)* and of the operations to be carried out (including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.

6.9

Contractor´s Personnel

The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations The Engineer may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor´s Representative if applicable, who:

(a) persist in any misconduct or lack of care,
(b) carries out duties incompetently or negligently,
(c) fails to conform with any provisions of the Contract, or
(d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.

If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

6.10

Records of Contractor´s Personnel and Equipment

The Contractor shall submit, to the Engineer, details showing the number of each class of Contractor´s Personnel and of each type of Contractor´s Equipment on the Site. Details shall be submitted each calendar month, in a form approved by the Engineer, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

6.11

Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

Plant, Materials and Workmanship

7.1

Manner of Exeution

The Contractor shall carry out the manufacture of Plant, the production and manufacture of Materials, and all other execution of the Works:

(a) in the manner (if any) specified in the Contract,
(b) in a proper workmanlike and careful manner, in accordance with recognised good practice, and
(c) with properly equipped facilities and non-hazardous Materials, except as otherwise specified in the Contract.

7.2

Samples

The Contractor shall submit the following samples of Materials, and relevant information, to the Engineer for review in accordance with the procedures for Contractor's Documents described in Sub-Clause 5.2 *[Contractor's Documents]:*

(a) manufacturer's standard samples of Materials and samples specified in the Contract, all at the Contractor's cost, and
(b) additional samples instructed by the Engineer as a Variation.

Each sample shall be labelled as to origin and intended use in the Works.

7.3

Inspection

The Employer's Personnel shall at all reasonable times:

(a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and
(b) during production, manufacture and construction (at the Site and elsewhere) be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

The Contractor shall give the Employer´s Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility.

The Contractor shall give notice to the Engineer whenever any work is ready and before its covered up, put out of sight, or packaged or storage or transport. The

Engineer shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Engineer does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Engineer, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

7.4

Testing

This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any).

The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

The Engineer may, under Clause 13 *[Variations and Adjustments],* vary the location or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, notwithstanding other provisions of the Contract.

The Engineer shall give the Contractor not less than 24 hours' notice of the Engineer's intention to attend the tests. If the Engineer does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Engineer, and the tests shall then be deemed to have been made in the Engineer's presence.

If the Contractor suffers delay and/or incurs Cost from complying with these instructions or as a result of a delay for which the Employer is responsible, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 *[Extension of Time for Completion],* and
(b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

The Contractor shall promptly forward to the Engineer duly certified reports of the tests. When the specified tests have been passed the Engineer shall endorse he Contractor's test certificate, or issue a certificate to him, to that effect. If the Engineer has not attended the tests, he shall be deemed to have accepted the readings as accurate.

7.5

Rejection

If, as result of an examination, inspection, measurement or testing, any Plant, Materials, design or workmanship is found to be defective or otherwise not in accordance with the Contract, the Engineer any reject the Plant, Materials, design or workmanship by giving notice to the Contractor, with reasons. The contractor shall then promptly make good the defect and ensure that rejected item complies with the Contract.

If the Engineer requires this Plant, Materials, design or workmanship to be retested the tests shall be repeated under the same terms and conditions. If the rejection and

retesting cause the Employer to Incur additional costs, the Contractor shall subject to Sub-Clause 2.5 *[Employer's Claims],* pay these costs to the Employer.

7.6

Remedial Work

Notwithstanding any previous test or certification, the Engineer may instruct the Contractor to:

(a) remove from the Site and replace any Plant or Materials which is not in accordance with the Contract,

(b) remove and re-execute any other work which is not in accordance with the Contract, and

(c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise.

The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the instruction, or immediately if urgency is specified under sub-paragraph (c).

If the Contractor fails to comply with the instruction, the Employer shall be entitled to employ and pay other persons to carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.5 *[Employer's Claims]* pay to the Employer all costs arising from this failure.

7.7

Ownership of Plant and Materials

Each Item of Plant and Materials shall, to the extent consistent with the Laws of the Country, become the property of the Employer at whichever is the earlier of the following times, free from liens and other encumbrances:

(a) when it is delivered to the Site;

(b) when the Contractor is entitled to payment of the value of the Plant and Materials under Sub-Clause 8.10 [*Payment for Plant and Materials in Event of Suspension*].

7.8

Royalties

Unless otherwise stated in the Employer's Requirements, the Contractor shall pay all royalties, rents and other payments for:

(a) natural Materials obtained from outside the Site, and

(b) the disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made), except to the extent that disposal areas within the Site are specified in the Contract.

Commencement, Delays and Suspension

8.1

Commencement of Work

The Engineer shall give the Contractor not less than 7 days´ notice of the Commencement Date. Unless otherwise stated In the Particular Conditions, the Commencement Date shall be within 42 days after the Contractor receives the Letter of Acceptance.

The Contractor shall commence the design and execution of the Works as soon as is reasonably practicable after Commencement date, and shall then proceed with the Works with due expedition and without delay.

8.2

Time for Completion

The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Work or Section (as the case may be), including:

(a) achieving the passing of the Tests on completion, and
(b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 *[Taking Over of the Works and Sections]*.

8.3

Programme

The Contractor shall submit a detailed time programme to the Engineer within 28 days after receiving the notice under Sub-Clause 8.1 *[Commencement of Works].* The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include:

(a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design, Contractor's' Documents, procurement, manufacture, inspection, delivery to Site, construction, erection, testing, commissioning and trial operation,
(b) the periods for reviews under Sub-Clause 5.2 *[Contractor's Documents]* and for any other submissions, approvals and consents specified in the Employer's Requirements,
(c) the sequence and timing of inspections and tests specified in the Contract, and
(d) a supporting report which includes:

    (i) a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and
    (ii) details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor´s Equipment, required on the Site for each major stage.

Unless the Engineer, within 21 days after receiving a programme gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Employer's Personnel shall be entitled to rely upon the programme when planning their activities,

The Contractor shall promptly give notice to the Engineer of specific probable future events or circumstances which may adversely affect the work increase the Contract Price or delay the execution of the Works. The Engineer may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances, and/or a proposal under Sub-Clause 13.3 *[Variation Procedure]*.

If, at any time, the Engineer gives notice to the Contractor that a programme fails (to the extent stated) to comply the Contract or to be consistent with actual progress and the Contractor´s stated intentions, the Contractor shall submit a revised programme to the Engineer in accordance with this Sub- Clause.

8.4

Extension of Time for Completion

The Contractor shall be entitled subject to Sub-Clause 20.1 [*Contractor´s Claims*] to an extension of the Time for Completion if and to the extent that completion for the

purposes of Sub-Clause 10.1 *[Taking Over of the Works and Sections]* is or will be delayed by any of the following causes:

(a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 *[Variation Procedure]),*
(b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,
(c) exceptionally adverse climatic conditions,
(d) Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or governmental actions, or
(e) any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors on the Site.

If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Engineer in accordance with Sub-Clause 20.1 *[Contractor's Claims].* When determining each extension of time under Sub-Clause 20.1, the Engineer shall review previous determinations and may increase, but shall not decrease, the total extension of time.

8.5

Delays Caused by Authorities

If the following conditions apply, namely:

(a) the Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in the Country,
(b) these authorities delay or disrupt the Contractor's work, and
(c) the delay or disruption was Unforeseeable,

then this delay or disruption will be considered as a cause of delay under sub-paragraph (b) of Sub-Clause 8.4 *[Extension of Time for Completion].*

8.6

Rate of Progress

If, at any time:

(a) actual progress is too slow to complete within the Time for Completion, and/or
(b) progress has fallen (or will fall) behind the current programme under Sub-Clause 8.3 *[Programme],*

other than as a result of a cause listed in Sub-Clause 8.4 *[Extension of Time for Completion],* then the Engineer may instruct the Contractor to submit under Sub-Clause 8.3 *[Programme],* a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

Unless the Engineer notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor´s Personnel and/or Goods, at the risk and cost of the Contractor. If these revised methods cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 [*Employer´s Claims]* pay these costs to the Employer, in addition to delay damages (if any) under Sub-Clause 8.7 below.

8.7

Delay Damages

If the Contractor fails to comply with Sub-Clause 8.2 [*Time for Completion]*, the Contractor shall subject to Sub-Clause 2.5 [*Employer´s Claims]* pay delay damages to the Employer for this default. These delay images shall be the sum stated in the Appendix to Tender, which shall be paid for every day which shall elapse between the

relevant Time for Completion and the date stated in the Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of delay damages (if any) stated in the Appendix to Tender.

These delay damages shall be the only damages due from the Contractor for such default, other than In the event of termination under Sub-Clause 15.2 *[Termination by Employer]* prior to completion of the Works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.

8.8

Suspension of Work

The Engineer may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works against any deterioration, loss or damage.

The Engineer may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub-Clause 8.9, 8.10 and 8.11 shall not apply.

8.9

Consequenses of Suspension

If the Contractor suffers delay and/or incurs Cost from complying with the Engineer's instructions under Sub-Clause 8.8 *[Suspension of Work]* and/or from resuming the work, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 *[Extension of Time for Completion]*, and
(b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 8.8 *[Suspension of Work].*

8.10

Payment for Plant and Materials in Event of Suspension

The Contractor shall be entitled to payment of the value (as at the date of suspension) of Plant and/or Materials which have not been delivered to Site, if:

(a) the work on Plant or delivery of Plant and/or Materials has been suspended for more than 28 days, and
(b) the Contractor has marked the Plant and/or Materials as the Employer's property in accordance with the Engineer's instructions.

8.11

Prolonged Suspension

If the suspension under Sub-Clause 8.8 [*Suspension of Work]* has continued for more that 84 days, the Contractor may request the Engineer´s permission to proceed. If the Engineer does not give permission within 28 days after being requested to do so, the Contractor may, by giving notice to the Engineer, treat the suspension as an omission under Clause 13 [*Variations and Adjustments*] of the aftected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause 16.2 [*Termination by Contractor*].

8.12
Resumption of Work

After the permission or instruction to proceed is given, the Contractor and the Engineer shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension.

Tests on Completion

9.1
Contractor´s Obligations

The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.4 *[Testing],* after providing the documents in accordance with Sub-Clause 5.6 *[As-Built Documents]* and Sub-Clause 5.7 *[Operation and Maintenance Manuals].*

The Contractor shall give to the Engineer not less than 21 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 14 days after this date, on such day or days as the Engineer shall instruct.

Unless otherwise stated in the Particular Conditions, the Tests on Completion shall be carried out in the following sequence:

(a) pre-commissioning tests, which shall include the appropriate inspections and ("dry" or "cold") functional tests to demonstrate that each item of Plant can safely undertake the next stage, (b);
(b) commissioning tests, which shall include the specified operational tests to demonstrate that the Works or Section can be operated safely and as specified, under all available operating conditions; and
(c) trial operation, which shall demonstrate that the Works or Section perform reliably and in accordance with the Contract.

During trial operation, when the Works are operating under stable conditions, the Contractor shall give notice to the Engineer that the Works are ready for any other Tests on Completion, including performance tests to demonstrate whether the Works conform with criteria specified in the Employer's Requirements and with the Schedule of Guarantees.

Trial operation shall not constitute a taking-over under Clause 10 *[Employer's Taking Over].* Unless otherwise stated in the Particular Conditions, any product produced by the Works during trial operation shall be the property of the Employer.

In considering the results of the Tests on Completion, the Engineer shall make allowances for the effect of any use of the Works by the Employer on the performance or otrhe characteristics of the Works. As soon as the Works, or a Section, have passed each of the Tests on Completion described in sub-paragraph (a), (b) or (c), the Contractor shall submit a certified report of the results of these Tests to the Engineer.

9.2
Delayed Tests

If the Tests on Completion are being unduly delayed by the Employer, Sub-Clause 7.4 *[Testing]* (fifth paragraph) and/or Sub-Clause 10.3 *[Interference with Tests on Completion]* shall be applicable.

If Tests on Completion are being unduly delayed by Contractor, the Engineer may by notice require the Contractor to carry out the Tests within 21 days after receiving the notice. The Contractor shall carry out the Tests on such day or days

within that period as the Contractor may fix and of which he shall give notice to the Engineer.

If the Contractor fails to carry out the Tests on Completion within the period of 21 days, the Employer's Personnel may proceed with the Tests at the risk and cost of the Contractor. The Tests on Completion shall then be deemed to have been carried out in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

9.3

Retesting

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 7.5 *[Rejection]* shall apply, and the Engineer or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.

9.4

Failure to Pass Tests on Completion

If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub-Clause 9.3 *[Retesting],* the Engineer shall be entitled to:

(a) order further repetition of Tests on Completion under Sub-Clause 9.3;
(b) if the failure deprives the Employer of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Employer shall have the same remedies as are provided in sub-paragraph (c) of Sub-Clause 11.4 *[Failure to Remedy Defects];* or
(c) issue a Taking-Over Certificate, if the Employer so requests.

In the event of sub-paragraph (c), the Contractor shall then proceed in accordance with all other obligations under the Contract, and the Contract Price shall be reduced by such amount as shall be appropriate to cover the reduced value to the Employer as a result of this failure. Unless the relevant reduction for this failure is stated (or its method of calculation is defined) in the Contract, the Employer may require the reduction to be (i) agreed by both Parties (in full satisfaction of this failure only) and paid before this Taking-Over Certificate is issued, or (ii) determined and paid under Sub-Clause 2.5 *[Employer's Claims]* and Sub-Clause 3.5 *[Determinations].*

Employer's Taking Over

10.1

Taking Over of the Works and Sections

Except as stated in Sub-Clause 9.4 *[Failure to Pass Tests on Completion]*, the Works shall be taken over by the Employer when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 8.2 *[Time for Completion]* and except as allowed in sub-paragraph (a) below and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.
The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 days before the Works will, in the Contractor's opinion be complete and ready for taking over. If the Works are divided into Sections the Contractor may similarly apply for a Taking-Over Certificate for each Section.

Engineer shall, within 28 days after receiving the Contractor's application:

(a) issue the Taking-Over Certificate to the Contractor stating the date on which the Works or Section were completed in accordance with the Contract, except

for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or

(b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application with the period of 28 days, and if the Works or Section (as the case may be) are substantially in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on the last day of that period.

10.2

Taking Over of Parts of the Works

The Engineer may, at the sole discretion of the Employer, issue a Taking-Over Certificate for any part of the Permanent Works.

The Employer shall not use any part of the Works (other than as a temporary measure which is either specified in the Contract or agreed by both Parties) unless and until the Engineer has issued a Taking-Over Certificate for this part. However, if the Employer does use any part of the Works before the Taking-Over Certificate is issued:

(a) the part which is used shall be deemed to have been taken over as from the date on which it is used,

(b) the Contractor shall cease to be liable for the care of such part as from this date, when responsibility shall pass to the Employer, and

(c) if requested by the Contractor, the Engineer shall issue a Taking-Over Certificate for this part.

After the Engineer has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry date of the relevant Defects Notification Period.

If the Contractor incurs Cost as a result of the Employer taking over and/or using a part of the Works, other than such use as is specified in the Contract or agreed by the Contractor, the Contractor shall (i) give notice to the Engineer and (ii) be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to payment of any such Cost plus reasonable profit, which shall be included in the Contract Price. After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine this Cost and profit.

If a Taking-Over Certificate has been issued for a part of the Works (other than a Section), the delay damages thereafter for completion of the remainder of the Works shall be reduced. Similarly, the delay damages for the remainder of the Section (if any) in which this part is included shall also be reduced for any period of delay after the date stated in this Taking-Over Certificate, the proportional reduction in these delay damages shall be calculated as the proportion which the value of the part so certified bears to the value of the Works or Section (as the case may be) as a whole. The Engineer shall proceed in accordance with Sub-Clause 3.5 [*Determinations*] to agree or determine these proportions. The provisions of this paragraph shall only apply to the daily rate of delay damages under Sub-Clause 8.7 *[Delay Damages]*, and shall not affect the maximum amount of these damages.

10.3
Interference with Tests

If the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Employer is responsible, the Employer shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed.

The Engineer shall then issue a Taking-Over Certificate accordingly, and the Contractor shall carry out the Tests on Completion as soon as practicable, before the expiry date of the Defects Notification Period. The Engineer shall require the Tests on Completion to be carried out by giving 14 days' notice and in accordance with the relevant provisions of the Contract.

If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 *[Extension of Time for Completion],* and
(b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

10.4

Surfaces Requiring Reinstatement

Except as otherwise stated in a taking-Over Certificate, a certificate for a Section or part of the Works shall not be deemed to certify completion of any ground or other surfaces requiring reinstatement.

Defects Liability

11.1

Completion of Outstanding Work and Remedying Defects

In order that the Works and Contractor's Documents, and each Section shall be in the condition required by the Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, the Contractor shall:

(a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Engineer, and
(b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the Employer on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

If a defect appears or damage occurs, the Contractor shall be notified accordingly, by (or on behalf) the Employer.

11.2

Cost of Remedying Defetcts

All work referred to in sub-paragraph (b) of Sub-Clause 11.1 [*Completion of Outstanding Work and Remedying Defects]* shall be executed at the risk and cost of the Contractor, if and to the extent that work is attributable to:

(a) the design of the Works other than a part of the design for which the Employer is responsible (if any),
(b) Plant, Materials or workmanship not being in accordance with the Contract,

(c) improper operation or maintenance which was attributable to matters for which the Contractor is responsible (under Sub-Clauses 5.5 to 5.7 or otherwise), or

(d) failure by the Contractor to comply with any other obligation.

If and to the extent that such work is attributable to any other cause, the Contractor shall be notified promptly by (or on behalf of) the Employer, and Sub-Clause 13.3 [*Variation Procedure*] shall apply.

11.3

Extension of Defects Notification Period

The Employer shall be entitled subject to Sub-Clause 2.5 *[Employer's Claims]* to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or damage. However, a Defects Notification Period shall not be extended by more than two years.

If delivery and/or erection of Plant and/or Materials was suspended under Sub-Clause 8.8 *[Suspension of Work]* or Sub-Clause 16.1 *[Contractor's Entitlement to Suspend Work],* the Contractor's obligations under this Clause shall not apply to any defects or damage occurring more than two years after the Defects Notification Period for the Plant and/or Materials would otherwise have expired.

11.4

Failure to Remedy Defects

If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by (or on behalf of) the Employer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date.

If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause 11.2 *[Cost of Remedying Defects],* the Employer may (at his option):

(a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.5 *[Employer's Claims]* pay to the Employer the costs reasonably incurred by the Employer in remedying the defect or damage;

(b) require the Engineer to agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause 3.5 *[Determinations];* or

(c) in the defect or damage deprives the Employer of substantially the whole benefit of the Works or any major part of the Works terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contract or otherwise, the Employer shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.

11.5

Removal of Defective Work

If the defect or damage cannot be remedied expeditiously on the site and the Employer gives consent, the Contractor may remove from the Site for the purposes of repair such items of Plant, as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items, or to provide other appropriate security.

11.6

Futher Tests

If the work of remedying of any defect or damage may affect the performance of the Works, the Engineer may require the repetition of any the tests described in the

Contract, including Tests on Completion and/or Tests after Completion. The requirement shall be made by notice within 28 days after the defect or damage is remedied.

These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Party liable, under Sub-Clause 11.2 *[Costs of Remedying Defects]*, for the cost of the remedial work.

11.7

Right of Access

Until the Performance Certificate has been issued, the Contractor shall have the right of access to all parts of the Works and to records of the operation and performance of the Works, except as may be inconsistent with the Employer's reasonable security restrictions.

11.8

Contractor to Search

The Contractor shall, if required by the Engineer, search for the cause of any defect under the direction of the Engineer. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause 11.2 *[Cost of Remedying Defects],* the Cost of the search plus reasonable profit shall be agreed or determined by the Engineer in accordance with Sub-Clause 3.5 *[Determinations]* and shall be included in the Contract Price.

11.9

Performance certificate

Performance of the Contractor's obligations shall not be considered to have been completed until the Engineer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.

The Engineer shall issue the Performance Certificate within 28 days after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Employer.

Only the Performance Certificate shall be deemed to constitute acceptance of the Works.

11.10

Unfulfilled Obligations

After the Performance Certificate has been issued, each Party shall remain liable for the fulfillment of any obligation which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.

11.11

Clearance of Site

Upon receiving the Performance Certificate the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

If all these items have not been removed within 28 days after the Employer receives a copy of the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items. The Employer shall be entitled to be paid the cost incurred in connection with, or attributable to, such sale or disposal and restoring the Site.

Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Employer´s costs, the Contractor shall pay the outstanding balance to the Employer.

Test after Completion

12.1

Proceduren for Tests after Completion

If Tests after Completion are specified in the Contract, this Clause shall apply. Unless otherwise stated in the Particular Conditions, the Employer shall:

(a) provide all electricity, equipment, fuel, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the Tests after Completion efficiently, and

(b) carry out the Tests after Completion in accordance with the manuals supplied by the Contractor under Sub-Clause 5.7 *[Operation and Maintenance Manuals]* and such guidance as the Contractor may be required to give during the course of these Tests; and in the presence of such Contractor's Personnel as either Party may reasonably request.

The Tests after Completion shall be carried out as soon as is reasonably practicable after the Works or Section have been taken over by the Employer. The Employer shall give to the Contractor 21 days' notice of the date after which the Tests after Completion will be carried out. Unless otherwise agreed, these Tests shall be carried out within 14 days after this date, on the day or days determined by the Employer.

If the Contractor does not attend at the time and place agreed, the Employer may proceed with the Tests after Completion, which shall be deemed to have been made in the Contractor's presence, and the Contractor shall accept the readings as accurate.

The results of the Tests after Completion shall be compiled and evaluated by both Parties. Appropriate account shall be taken of the effect of the Employer's prior use of the Works.

12.2

Delayed Tests

If the Contractor incurs Cost as a result of any unreasonable delay by the Employer to the Tests after Completion, the Contractor shall (i) give notice to the Engineer and (ii) be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine this Cost and profit.

If, for reasons not attributable to the Contractor, a Test after Completion on the Works or any Section cannot be completed during the Defects Notification Period (or any other period agreed upon by both Parties), then the Works or Section shall be deemed to have passed this Test after Completion.

12.3

Retesting

If the Works, or a Section, fall to pass the Tests after Completion:

(a) sub-paragraph (b) of Sub-Clause 11.1 *[Completion of Outstanding Work and Remedying Defects]* shall apply, and

(b) either Party may then require the failed Tests and the Tests after Completion on any related work, to be repeated under the same terms and conditions.

If and to the extent that this failure and retesting are attributable to any of the matters listed in sub-paragraphs (a) to (d) of Sub-Clause 11.2 [*Cost of remedying Defects*]

and cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.5 *[Employer's Claims]* pay these costs to the Employer.

12.4

Failure to Pass Tests After Completion

If the following conditions apply, namely:

(a) the Works, or a Section, fail to pass any or all of the Tests after Completion,

(b) the relevant sum payable as non-performance damages for this failure is stated (or its method of calculation is defined) in the Contract, and

(c) the Contractor pays this relevant sum to the Employer during the Defects Notification Period,

then the Works or Section shall be deemed to have passed these Tests after Completion.

If the Works, or a Section, fail to pass a Test after Completion and the Contractor proposes to make adjustments or modifications to the Works or such Section, the Contractor may be instructed by (or on behalf of) the Employer that right of access to the Works or Section cannot be given until a time that is convenient to the Employer. The Contractor shall then remain liable to carry out the adjustments or modifications and to satisfy this Test, within a reasonable period of receiving notice by (or on behalf of) the Employer of the time that is convenient to the Employer. However, if the Contractor does not receive this notice during the relevant Defects Notification Period, the Contractor shall be relieved of this obligation and the Works or Section (as the case may be) shall be deemed to have passed this Test after Completion.

If the Contractor incurs additional Cost as a result of any unreasonable delay by the Employer in permitting access to the Works or Plant by the Contractor, either to investigate the causes of a failure to pass a Test after Completion or to carry out any adjustments or modifications, the Contractor shall (i) give notice to the Engineer and (ii) be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to payment of any such Cost plus reasonable profit, which shall be included in the Contract Price

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine this Cost and profit.

Variations and Adjustments

13.1

Right to Vary

Variations may be initiated by the Engineer at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal. A Variation shall not comprise the omission of any work which is to be carried out by others.

The Contractor shall execute and be bound by each Variation unless the Contractor promptly gives notice to the Engineer stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, (ii) it will reduce the the safety or suitability of the Works, or (iii) it will have an adverse impact on the achievement of the Schedule of Guarentees. Upon receiving this notice, the Engineer shall cancel, confirm or vary the instruction.

13.2

Value Engineering

The Contractor may, at any time, submit to the Engineer a written proposal which (in the Contractor´s opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost

to the Employer of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Employer of the completed Works, or (iv) otherwise be of benefit to the Employer.

The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause 13.3 [*Variation Procedure*].

13.3

Variation Procedure

If the Engineer requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

(a) a description of the proposed design and/or work to be performed and a programme for its execution,

(b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3 *[Programme]* and to the Time for Completion, and

(c) the Contractor's proposal for adjustment to the Contract Price.

The Engineer shall, as soon as practicable after receiving such proposal (under Sub-Clause 13.2 *[Value Engineering]* or otherwise), respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response.

Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Engineer to the Contractor, who shall acknowledge receipt.

Upon instructing or approving a Variation, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine adjustments to the Contract Price and the Schedule of Payments. These adjustments shall include reasonable profit, and shall take account of the Contractor's submissions under Sub-Clause 13.2 *[Value Engineering]* if applicable.

13.4

Payment in Applicable Currencies

If the Contract provides for payment of the Contract Price in more than one currency, then whenever an adjustment is agreed, approved or determined as stated above, the amount payable in each of the applicable currencies shall be specified. For this purpose, reference shall be made to the actual or expected currency proportions of the Cost of the varied work, and to the proportions of various currencies specified for payment of the Contract Price.

13.5

Provisional Sums

Each Provisional Sum shall only be used, in whole or in part in accordance with the Engineer's instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Engineer shall have instructed. For each Provisional Sum, the Engineer may instruct:

(a) work to be executed (including Plant, Materials or services to be supplied) by the Contractor and value under Sub-Clause 13.3 [*Variation Procedure*]; and/or

(b) Plant, Materials or services to be purchased by the Contractor for which there shall be included in the Contract Price:

  (i) the actual amounts paid (or due to be paid) by the Contractor, and

  (ii) a sum for overhead charges and profit, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the appropriate Schedule. If there is no such rate, the percentage rate stated in the Appendix to Tender shall be applied.

The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

13.6

Daywork

For work of a minor or incidental nature, the Engineer may instruct that a Variation shall be executed on a daywork basis. The work shall then be valued in accordance with the daywork schedule included in the Contract, and the following procedure shall apply. If a daywork schedule is not included in the Contract, this Sub-Clause shall not apply.

Before ordering Goods for the work, the Contractor shall submit quotations to the Engineer. When applying for payment, the Contractor shall submit invoices, vouchers and accounts or receipts for any Goods.

Except for any items for which the daywork schedule specifies that payment is not due, the Contractor shall deliver each day to the Engineer accurate statements in duplicate which shall include the following details of the resources used in executing the previous day's work:

(a) the names, occupations and time of Contractor´s Personnel,
(b) the identification, type and time of Contractor´s Equipment and Temporary Works, and
(c) the quantities and types of Plant and Materials used.

One copy of each statement will, if correct, or when agreed, be signed by the Engineer and returned to the Contractor. The Contractor shall then submit priced statements of these resources to the Engineer, prior to their inclusion in the next Statement under Sub-Clause 14.3 *[Application for Interim Payment Certificates].*

13.7

Adjustment for Changes in Legislation

The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of the Country (including the introduction of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the Base Date which affect the Contractor in the performance of obligations under the Contract.

If the Contractor suffers (or will suffer) delay and/or incurs (or will incur) additional Cost as a result of these changes in the Laws or in such interpretations made after the Base Date, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay if completion is or will be delayed under Sub-Clause 8.4 *[Extension of Time for Completion]*, and
(b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

13.8

Adjustment for Changes in Cost

In this Sub-Clause, "table of adjustment data" means the completed table of adjustment data included in the Appendix to tender. If there is no such table of adjustment data, this Sub-Clause shall not apply.

If this Sub-Clause applies, the amounts payable to the Contractor shall be adjusted for rises or falls in the cost of labour, Goods and other inputs to the Works, by the addition or deduction of the amounts determined by the formulae prescribed in this Sub-Clause. To the extent that full compensation for any rise or fall in Costs is not

covered by the provisions of this or other Clauses, the Accepted Contract Amount shall be deemed to have included amounts to cover the contingency of other rises and falls in costs.

The adjustment to be applied to the amount otherwise payable to the Contractor, as valued in accordance with the appropriate Schedule and certified in Payment Certificates, shall be determined from formulae for each of the currencies in which the Contract Price is payable. No adjustment is to be applied to work valued on the basis of Cost or current prices. The formulae shall be of the following general type:

$$\mathbf{P}n = a + b\frac{\mathbf{L}n}{\mathbf{L}o} + c\frac{\mathbf{E}n}{\mathbf{E}o} + d\frac{\mathbf{M}n}{\mathbf{M}o} + \ldots\ldots\ldots\ldots\ldots$$

where:

"Pn" is the adjustment multiplier to be applied to the estimated contract value in the relevant currency of the work carried out in period "n", this period being a month unless otherwise stated in the Appendix to Tender;

"a" is a fixed coefficient, stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments;

"b", "c", "d", ... are coefficients representing the estimated proportion of each cost element related to the execution of the Works, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as labour, equipment and materials;

"**L**n", "**E**n", "**M**n", ... are the current cost indices or reference prices for period "n", expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the date 49 days prior to the last day of the period (to which the particular Payment Certificate relates); and

"**L**o", "**E**o", "**M**o", ... are the base cost indices or reference prices, expressed in the relevant currency of payment, each of which is applicable to the relevant tabulated cost element on the Base Date.

The cost indices or reference prices stated in the table of adjustment data shall be used. If their source is in doubt, it shall be determined by the Engineer. For this purpose, reference shall be made to the values of the indices at stated dates (quoted in the fourth and fifth columns respectively of the table) for the purposes of clarification of the source; although these dates (and thus these values) may not correspond to the base cost indices.

In cases where the "currency of index" (stated in the table) is not the relevant currency of payment, each index shall be converted into the relevant currency of payment at the selling rate, established by the central bank of the Country, of this relevant currency on the above date for which the index is required to be applicable.

Until such time as each current cost index is available, the Engineer shall determine a provisional index for the Issue of Interim Payment Certificates. When a current cost index is available, the adjustment shall be recalculated accordingly.

If the Contractor falls to complete the Works within the Time for Completion, adjustment of prices thereafter shall be made using either (i) each index or price applicable on the date 49 days prior to the expiry of the Time for Completion of the Works, or (ii) the current index or price: whichever is more favourable to the Employer.

The weightings (coefficients) for each of the factors of cost stated in the table(s) of adjustment data shall only be adjusted if they have been rendered unreasonable, unbalanced or inapplicable, as a result of Variations.

Contract Price and Payment

14.1

The Contract Price

Unless otherwise stated in the Particular Conditions:

(a) the Contract Price shall be the lump sum Accepted Contract Amount and be subject to adjustments in accordance with the Contract;

(b) the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs, except as stated in Sub-Clause 13.7 *[Adjustments for Changes in Legislation];*

(c) any quantities which may be set out in a Schedule are estimated quantities and are not to be taken as the actual and correct quantities of the Works which the Contractor is required to execute; and

(d) any quantities or price data which may be set out in a Schedule shall be used for the purposes stated in the Schedule and may be inapplicable for other purposes.

However, if any part of the Works is to be according to quantity supplied or work done, the provisions for measurement and evaluation shall be as stated in the Particular Conditions. The Contract Price shall be determined accordingly subject to adjustments in accordance with the Contract.

14.2

Advance Payment

The Employer shall make an advance payment, as an interest-free loan for mobilisation and design, when the Contractor submits a guarantee in accordance with this Sub-Clause. The total advance payment, the number and timing of instalments (if more than one), and the applicable currencies and proportions shall be as stated in the Appendix to Tender.

Unless and until the Employer receives this guarantee, or if the total advance payment is not stated in the Appendix to Tender, this Sub-Clause shall not apply.

The Engineer shall issue an Interim Payment Certificate for the first instalment after receiving a Statement (under Sub-Clause 14.3 *[Application for Interim Payment Certificates])* and after the Employer receives (i) the Performance Security in accordance with Sub-Clause 4.2 *[Performance Security]* and (ii) a guarantee in amounts and currencies equal to the advance payment. This guarantee shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid, but its amount may be progressively reduced by the amount repaid by the Contractor as indicated in the Payment Certificates. If the terms of the guarantee specify its expiry date, and the advance payment has not been repaid by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the advance payment has been repaid.

The advance payment shall be repaid through percentage deductions in Payment Certificates. Unless other percentages are stated in the Appendix to Tender:

(a) deductions shall commerce in the Payment Certificate in with the total of all certified interim payments (excluding the advance payment and deductions and

repayments of retention) exceeds ten per cent (10%) of the Accepted Contract Amount less Provisional Sums; and

(b) deductions shall be made at the amortization rate of one quarter (25%) of the amount of each Payment Certificate (excluding the advance payment and deductions and repayments of retention) in the currencies and proportions of the advance payment, until such time as the advance payment has been repaid.

If the advance payment has not been repaid prior the issue of the Taking-Over Certificate for the Works or prior to termination under Clause 15 [*Termination by Employer*], Clause 16 [*Suspension and Termination by Contractor*] or Clause 19 [*Fource Majeure*] (as the case may be), the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Employer.

14.3

Application for Interim Payment Certificates

The Contractor shall submit a Statement in six copies to the Engineer after the end of the period of payment stated in the Contract (if not stated, after the end of each month), in a form approved by the Engineer, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the relevant report on progress in accordance with Sub-Clause 4.21 *[Progress Reports].*

The Statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:

(a) the estimated contract value of the works executed and the Contractor´s Documents produced up to the end of the month (including Variations but excluding items described in sub-paragraphs (b) to (g) below);

(b) any amounts to be added and deducted for changes in legislation and changes in cost, in accordance with Sub-Clause 13.7 [*Adjustment for Changes in Legislation*] and Sub-Clause 13.8 [*Adjustment for Changes in Cost*];

(c) any amount to be deducted for retention, calculated by applying the percentage of retention stated in the Appendix to tender to the total of the above amounts, until the amount so retained by the Employer reaches the limit of Retention Money (if any) stated in the Appendix to Tender;

(d) any amounts to be added and deducted for the advance payment and repayments in accordance with Sub-Clause 14.2 [*Advance Payment*];

(e) any amounts to be added and deducted for Plant and Materials in accordance with Sub-Clause 14.5 [*Plant and Materials intended for the Works*];

(f) any other additions or deductions which may have become due under the Contract or otherwise, including those under Clause 20 [*Claims, Disputes and Arbitration*]; and

(g) the deduction of amounts certified in all previous Payment Certificates.

14.4

Schedule of Payment

If the Contract Includes a Schedule of Payments specifying the instalments in which Contract Price will be paid, then, unless otherwise stated in this Schedule:

(a) the instalments quoted in the Schedule of Payments shall be the estimated contract values for the purposes of sub- paragraph (a) of Sub- Clause 14.3 *[Application for Interim Payment Certificates]*

(b) Sub-Clause 14.5 *[Plant and Materials intended for the Works]* shall not apply; and

(c) if these instalments are not defined by reference to the actual progress achieved in executing the Works, and if actual progress is found to be less than

that on which the Schedule of Payments was based, then the Engineer may proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine revised instalments, which shall take account of the extent to which progress is less than that on which the instalments were previously based.

If the Contract does not include a Schedule of Payments, the Contractor shall submit non-binding estimates of the payments which he expects to become due during each quarterly period. The first estimate shall be submitted within 42 days after the Commencement Date. Revised estimates shall be submitted at quarterly intervals, until the Taking-Over Certificate has been issued for the Works.

14.5

Plant and Materials intended for the Works

If this Sub-Clause applies, Interim Payment Certificates shall include, under sub-paragraph (e) of Sub-Clause 14.3, (i) an amount for Plant and Materials which have been sent to the Site for incorporation in the Permanent Works, and (ii) a reduction when the contract value of such Plant and Materials is included as part of the Permanent Works under sub-paragraph (a) of Sub-Clause 14.3 *[Application for Interim Payment Certificates].*

If the lists referred to in sub-paragraphs (b)(i) or (c)(i) below are not included in the Appendix to Tender, this Sub-Clause shall not apply.

The Engineer shall determine and certify each addition if the following conditions are satisfied:

(a) The Contractor has:

(i) kept satisfactory records (including the orders, receipts, Costs and use of Plant and Materials) which are available for inspection, and

(ii) Submitted statement of the Cost of acquiring and delivering the Plant and Materials to the Site, supported by satisfactory evidence;

and either:

(b) the relevant Plant and Materials:

(i) are those listed in the Appendix to Tender for payment when shipped,

(ii) have been shipped to the country, en route to the Site, in accordance with the Contract; and

(iii) are described in a clean shipped bill of lading or other evidence of shipment, which has been submitted to the Engineer together with evidence of payment of freight and insurance, any other documents reasonably required, and a bank guarantee in o form and issued by an entity approved by the Employer in amounts and currencies equal to the amount due under this Sub-Clause: this guarantee may be in a similar form to the form fererred to in Sub-Clause 14.2 [*Advance Payment*] and shall be valid until the Plant and Materials are properly stored on Site and protected against loss, damage or deterioration;

or

(c) the relevant Plant and Materials:

(i) are those listed in the Appendix to Tender for payment when delivered to the site, and

(ii) have been delivered to and are stored on the Site, are protected against loss, damage or deterioration, and appear to be in accordance with the Contract.

The additional amount to be certified shall be the equivalent of eighty percent of the Engineer´s determination of the cost of the Plant and Materials (including delivery to Site), taking account of the documents mentioned in this Sub-Clause and of the contract value of the Plant and Materials.

The currencies for this additional amount shall be the same as those in which payment will become due when the contract value is included under sub-paragraph (a) of Sub-Clause 14.3 *[Application for Interim Payment Certificates).* At that time, the Payment Certificate shall include the applicable reduction which shall be equivalent to, and in the same currencies and proportions as, this additional amount for the relevant Plant and Materials.

14.6

Issue of Interim Payment Certificates

No amount will be certified or paid until the Employer has received and approved the Perfomance Security. Thereafter, the Engineer shall, within 28 days after receiving a Statement and supporting documents, issue to the Employer an Interim Payment Certificate which shall state the amount which the Engineer fairly determines to be due, with supporting particulars.

However, prior to issuing the Taking-Over Certificate for the Works, the Engineer shall not be bound to issue an Interim Payment Certificate in an amount which would (after retention and other deductions) be less than the minimum amount of Interim Payment Certificates (if any) stated in the Appendix to Tender. In this event the Engineer shall give notice to the Contractor accordingly.

An Interim Payment Certificate shall not be withheld for any other reason although:

(a) if anything supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or
(b) if the Contractor was or is failing to perform any work or obligation in accordance with the Contract, and had been so notified by the Engineer, the value of this work or obligation may be withheld until the work or obligation has been performed.

The Engineer may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate. A payment Certificate shall not be deemed to indicate the Engineer´s acceptance approval consent or satisfaction.

14.7

Payment

The Employer shall pay to the Contractor:

(a) the first instalment of the advance payment within 42 days after issuing the Letter of Acceptance or within 21 days after receiving the documents in accordance with Sub-Clause 4.2 [*Performance Security*] and Sub-Clause 14.2 [*Advance Payment*], whichever is later;
(b) the amount certified in each Interim Payment certificate within 56 days after the Engineer receives the Statement and supporting documents; and
(c) the amount certified in the Final Payment Certificate within 56 days after the Employer receives this Payment Certificate.

Payment of the amount due in each currency shall be made into bank account, nominated by the Contractor, in the payment country (for this currency) specified in the Contract.

14.8
Delayed payment

If the Contractor does not receive payment in accordance with Sub-Clause 14.7 *[Payment],* the Contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay. This period shall be deemed to commence on the date for payment specified in Sub-Clause 14.7 *[Payment],* irrespective (in the case of its sub-paragraph (b)) of the date on which any Interim Payment Certificate is issued.

Unless otherwise stated in the Particular Conditions, these financing charges shall be calculated at the annual rate of three percentage points above the discount rate of the central bank in the country of the currency of payment, and shall be paid in such currency.

The Contractor shall be entitled to this payment without formal notice or certification and without prejudice to any other right or remedy.

14.9

Payment of Retention Money

When the Taking-Over Certificate has been Issued for the Works, and the Works have passed all specified tests (including the Tests after Completion, if any), the first half of the Retention Money shall be certified by the Engineer for payment to the Contractor. If a Taking-Over Certificate is issued for a Section, the relevant percentage of the first half of the Retention Money shall be certified and paid when the Section passes all tests.

Promptly after the latest of the expiry dates of the Defects Notification Periods the outstanding balance of the Retention Money shall be certified by the Engineer for payment to the Contractor. If a Taking-Over Certificate was issued for a Section, the relevant percentage of the second half of the Retention Money shall be certified and paid promptly after the expiry date of the Defects Notification Period for the Section.

However, if any work remains to be executed under Clause 11 *[Defects Liability]* or Clause 12 *[Tests after Completion],* the Engineer shall be entitled to withhold certification of the estimated cost of this work until it has been executed.

The relevant percentage for each Section shall be the percentage value of the Section as stated in the Appendix to Tender. If the percentage value of a Section is not stated in the Appendix to Tender, no percentage of either half of the Retention Money shall be released under this Sub-Clause in respect of such Section.

14.10

Statement at Completion

Within 87 days after receiving the Taking-Over Certificate for Works, the Contractor shall submit to the Engineer six copies of a Statement at completion with supporting documents, in accordance with Sub-Clause 14.3 [*Aplication for Payment Certificates],* showing:

(a) the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works,
(b) any further sums which the Contractor considers to be due, and
(c) an estimate of any other amounts which the Contractor considers will become due to him under the Contract. Estimated amounts shall be shown separately in this Statement at completion.

The Engineer shall then certify in accordance with Sub Clause 14.6 *[Issue of Interim Payment Certificates.]*

14.11

Application for Final Payment Certificate

Within 56 days after receiving the performance Certificate, the Contractor shall submit, to the Engineer, six copies of a draft final statement with supporting documents showing in details in a form approved by the Engineer:

(a) the value of all work done in accordance with the Contract, and
(b) any further sums which the Contractor considers to by due to him under the Contract or otherwise.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement".

However if, following discussions between the Engineer and the Contractor and any changes to the draft final statement which are agreed, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement. Thereafter, if the dispute is finally resolved under Sub-Clause 20.4 *[Obtaining Dispute Adjudication Board's Decision]* or Sub-Clause 20.5 *[Amicable Settlement],* the Contractor shall then prepare and submit to the Employer (with a copy to the Engineer) a Final Statement.

14.12

Discharge

When submitting the Final Statement, the Contractor shall submit a written discharge which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the out-standing balance of this total in which event the discharge will be effective on such date.

14.13

Issue of Final Payment Certificate

Within 28 days after receiving the Final Statement and written discharge in accordance with Sub-Clause 14.11 *[Application for Final Payment Certificate]* and Sub-Clause 14.12 *[Discharge],* the Engineer shall issue, to the Employer, the Final Payment Certificate which shall state:

(a) the amount which is finally due, and
(b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled the balance (if any) due from the Employer to the Contractor or from the Contractor to the Employer, as the case may be.

If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 14.11 *[Application for Final Payment Certificate]* and Sub-Clause 14.12 *[Discharge],* the Engineer shall request the Contractor to do so. If the Contractor falls to submit an application within a period of 28 days the Engineer shall issue the Final Payment Certificate for such amount as he fairly determines to be due.

14.14

Cessation of Employer´s Liability

The Employer shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have include an amount expressly for it:

(a) in the Final Statement and also
(b) (except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause 14.10 [*Statement at Completion*].

However, this Sub-Clause shall not limit the Employer´s liability under his indemnification obligations, or the Employer´s liability in any case of fraud, deliberate default or reckless misconduct by the Employer.

14.15

Currencies of Payment

The Contract Price shall be paid in the currency or currencies named in the Appendix to Tender. Unless otherwise stated in the Particular Conditions, if more than one currency is so named, payments shall be made as follows:

(a) if the Accepted Contract Amount was expressed in Local Currency only:

  (i) the proportions or amounts of the Local and Foreign Currencies, and the fixed rates of exchange to be used for calculating the payments, shall be as stated in the Appendix to Tender, except as otherwise agreed by both Parties;
  (ii) payments and deductions under Sub-Clause 13.5 *[Provisional Sums]* and Sub-Clause 13.7 *[Adjustments for Changes in Legislation]* shall be made In the applicable currencies and proportions; and
  (iii) other payments and deductions under sub-paragraphs (a) to (d) of Sub-Clause 14.3 *[Application for Interim Payment Certificates]* shall be made in the currencies and proportions specified In sub-paragraph (a)(1) above;

(b) payment of the damages specified in the Appendix to Tender shall be made in the currencies and proportions specified in the Appendix to Tender;
(c) other payments to the Employer by the Contractor shall be made in the currency in which the sum was expended by the Employer, or in such currency as may be agreed by both Parties;
(d) if any amount payable by the Contractor to the Employer in a particular currency exceeds the sum payable by the Employer to the Contractor in that currency, the Employer may recover the balance of this amount from the sums otherwise payable to the Contractor in other currencies; and
(e) if no rates of exchange are stated in the Appendix to Tender, they shall be those prevailing on the Base Date and determined by the central bank of the Country.

Termination by Employer

15.1

Notice to Correct

If the Contractor fails to carry out any obligation under the Contract the Engineer may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

15.2

Termination by Employer

The Employer shall be entitled to terminate the Contract if the Contractor:

(a) fails to comply with Sub-Clause 4.2 *[Performance Security]* or with a notice under Sub-Clause 15.1 *[Notice to Correct]*,
(b) abandons the Works or orherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,
(c) without reasonable excuse fail:

  (i) to proceed with the Works in accordance with Clause 8 *[Commencement, Delays and Suspension]*, or
  (ii) to comply with a notice issued under Sub-Clause 7.5 *[Rejection]* or Sub-Clause 7.6 *[Remedial Work]*, within 28 days after receiving it,

(d) Subcontracts the whole of the Works or assigns the Contract without the required agreement,

(e) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events, or

(f) gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity commission or thing of value, as an inducement or reward:

(i) for doing or forbearing to do any action in relation to the Contract, or

(ii) for showing or forbearing to show favour or disfavor to any person in relation to the Contract,

or if any of the Contractor´s Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person any such inducement or reward as is described in this sub-paragraph (f). However, lawful inducements and rewards to Contractor´s Personnel shall not entitle termination.

In any of these events or circumstances, the Employer may, upon giving 14 days´ notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub-paragraph (e) or (f), the Employer may by notice terminate the Contract immediately.

The employer´s election to terminate the Contract shall not prejudice any other rights of the Employer, under the Contract or otherwise.

The Contractor shall then leave the Site and deliver any required Goods, all Contractor´s Documents, and other design documents made by or for him, to the Engineer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract, and (ii) for the protection of life or property or for the safety of the Works.

After termination, the Employer may complete the Works and/or arrange for any other entities to do so. The Employer and these entities may then use any Goods Contractor's Documents and other design documents made by or on behalf of the Contractor.

The Employer shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contactor shall promptly arrange their removal at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Employer, these items may be sold by the Employer in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

15.3

Valuation at Date of Termination

As soon as practicable after a notice of termination under Sub-Clause 15.2 *[Termination by Employer]* has taken effect, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine the value of the Works, Goods and Contractor´s Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

15.4

Payment after Termination

After a notice of termination under Sub-Clause 15.2 5 *[Determination by Employer]* has taken effect, the Employer may:

(a) proceed in accordance with Sub-Clause 2.5 *[Employer's Claims],*

(b) withhold further payments to the Contractor until the costs of design, execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established, and/or

(c) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 15.3 *[Valuation at Date of Termination].* After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor.

15.5

Employer´s Entitlement to Termination

The Employer shall be entitled to terminate the Contract, at any time for the Employer's convenience, by giving notice of such termination to the Contractor. The termination shall take effect 28 days after the later of the dates on which the Contractor receives this notice or the Employer returns the Performance Security. The Employer shall not terminate the Contract under this Sub-Clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor.

After this termination, the Contractor shall proceed in accordance with Sub-Clause 16.3 *[Cessation of Work and Removal of Contractor's Equipment]* and shall be paid in accordance with Sub-Clause 19.6 *[Optional Termination Payment and Release].*

Suspension and Termination by Contractor

16.1

Contractror´s Entitlement to Suspend Work

If the Engineer fails to certify in accordance with Sub-Clause 14.6 *[Issue of Interim Payment Certificates]* or the Employer fails to comply with Sub-Clause 2.4 *[Employer's Financial Arrangements]* or Sub-Clause 14.7 *[Payment],* the Contractor may, after giving not less than 21 days' notice to the Employer, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may be and as described in the notice.

The Contractor's action shall not prejudice his entitlements to financing charges under Sub-Clause 14.8 *[Delayed Payment]* and to termination under Sub-Clause 16.2 *[Termination by Contractor].*

If the Contractor subsequently receives such Payment Certificate evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.

If the Contractor suffers delay and/or incurs Cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay if completion is or will be delayed, under Sub-Clause 8.4 [*Extension of Time for Completion],* and

(c) payment of any such Cost plus reasonable profit which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

16.2

Termination by Contractor

The Contractor shall be entitled to terminate the Contract if:

(a) the Contractor does not receive the reasonable evidence within 42 days after giving notice under Sub-Clause 16.1 *[Contractor's Entitlement to Suspend Work]* in respect of a failure to comply with Sub-Clause 2.4 *[Employer's Financial Arrangements],*

(b) the Engineer falls, within 56 days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate,

(c) the Contractor does not receive the amount due under an Interim Payment Certificate within 42 days after the expiry of the time stated in Sub-Clause 14.7 *[Payment]* within which payment is to be made (except for deductions in accordance with Sub-Clause 2.5 *[Employer's Claims]),*

(d) the Employer substantially fails to perform his obligations under the Contract,

(e) the Employer falls to comply with Sub-Clause 1.6 *[Contract Agreement]* or Sub-Clause 1.7 *[Assignment],*

(f) a prolonged suspension affects the whole of the Works as described in Sub-Clause 8.11 *[Prolonged Suspension],* or

(g) the Employer becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events.

In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Employer, terminate the Contract. However, in the case of sub-paragraph (f) or (g), the Contractor may by notice terminate the Contract immediately.

The Contractor's election to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contract or otherwise.

16.3

Cessation of Work and Removal of Contractor´s Equipment

After a notice of termination under Sub-Clause 15.5 *[Employer´s Entitlement to Termination],* Sub-Clause 16.2 *[Termination by Contractor]* or Sub-Clause 19.6 *[Optional Termination, Payment and Release]* has taken effect the Contractor shall promptly:

(a) cease all further work, except for such work as may have been instructed by the Engineer for the protection of life or property or for the safety of the Works,

(b) hand over Contractor's Documents Plant Materials and other work, for which the Contractor has received payment, and

(c) remove all other Goods from the Site, except as necessary for safety and leave the Site.

16.4

Payment on Termination

After a notice of termination under Sub-Clause 16.2 *[Termination by Contractor]* has taken effect, the Employer shall promptly:

(a) return the Performance Security to the Contractor

(b) pay the Contractor in accordance with Sub-Clause 19.6 *[Optional Termination, Payment and Release], and*

(c) pay to the Contractor the amount of any loss of profit or other loss or damage sustained by the Contractor as a result of this termination.

Risk and Responsibility

17.1

Indemnities

The Contractor shall indemnify and hold harmless the Employer, the Employer's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

(a) bodily Injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the design, execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and

(b) damage to or loss of any property, real or personal (other than the Works) to the extent that such damage or loss:

  (i) arises out of in in the course of or by reason of the design, execution and completion of the Works and the remedying of any defects, and

  (ii) is attributable to any negligence, wilful act or breach of the Contract by the Contractor, the Contractor's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

The Employer shall indemnify and hold harmless the Contractor, the Contractor´s Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of (1) bodily injury, sickness, disease or death, which is attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer´s Personnel, or any of their respective agents, and (2) the mattes for which liability may be excluded from insurance cover as described in sub-paragraphs (d)(i), (ii) and (iii) of Sub-Clause 18.3 *[Insurance Against Injury to Persons and Damage to Property].*

17.2

Contractor´sCare of the Works

The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued under Sub-Clause 10.1 *[Taking Over of the Works and Sections])* for the Works, when responsibility for the care of the Works shall pass to the Employer. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section or part of the Works, responsibility for the care of the Section or part shall then pass to the Employer.

After responsibility has accordingly passed to the Employer the Contractor shall take responsibility for the care of any work which is outstanding on the date stated in a Taking-Over certificate, until this outstanding work has been completed.

If any loss or damage happens to the Works Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed in Sub-Clause 17.3 [*Employer´s Risks*], the Contractor shall rectify the loss or damage at the Contractor´s risk and cost, so that the Works, Goods and Contractor´s Documents conform with the Contract.

The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a taking- Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.

17.3

Employers Risks

The risks referred to in Sub-Clause 17.4 below are:

(a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,

(b) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country,

(c) riot, commotion or disorder within the Country by persons other than the Contractor's Personnel and other employees of the Contractor and Subcontractors,

(d) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, within the Country, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity,

(e) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,

(f) use or occupation by the Employer of any part of the Permanent Works, except as may be specified in the Contract,

(g) design of any part of the Works by the Employer's Personnel or by others for whom the Employer Is responsible, if any, and

(h) any operation of the forces of nature which is Unforeseeable or against which an experienced contractor could not reasonably have been expected to have taken adequate preventative precautions.

17.4

Consequences of Employer´s Risks

If and to the extent that any of the risks listed in Sub-Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer.

If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 *[Extension of Time for Completion],* and

(b) payment of any such Cost, which shall be included in the Contract Price. In the case of sub-paragraphs (f) and (g) of Sub-Clause 17.3 *[Employer's Risks]* reasonable profit on the Cost shall also be included.

After receiving this further notice, the Engineer shall proceed In accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

17.5

Intellectual and Industrial Property Rights

In this Sub-Clause, "infringement" means an infringement (or alleged infringement) of any patent, registered design, copyright, trade mark trade name trade secret or other intellectual or industrial property right relating to the Works; and “claim” means a claim (or proceeding pursuing a claim) alleging an infringement.

Whenever a Party does not give notice to the other Party of any claim within 28 days of receiving the claim, the first Party shall be deemed to have waived any right to indemnity under this Sub-Clause.

The Employer shall indemnify and hold the Contractor harmless against and from any claim alleging an infringement which is or was:

(a) an unavoidable result of the Contractor´s compliance with the Employer´s Requirements, or

(b) a result of any Works being used by the Employer

(i) for a purpose other than that indicated by, the reasonably to be interred from the Contract, or

(ii) in conjuction with anything not supplied by the Contractor, unless such use was disclosed to the Contractor prior to the Base date or is stated in the Contract.

The Contractor shall indemnify and hold the Employer harmless against and from any other claim which arises out of or in relation to (i) the Contractor's design manufacture, construction or execution of the Works, (ii) the use of Contractor's Equipment, or (iii) the proper use of the Works.

If a Party is entitled to be indemnified under this Sub-Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration which may arise from it. The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, litigation or arbitration upon being requested to do so by such other Party.

17.6

Limitation of Liability

Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract, other than under Sub-Clause 16.4 *[Payment on Termination]* and Sub-Clause 17.1 *[Indemnities].*

The total liability of the Contractor to the Employer, under or in connection with the Contract other than under Sub-Clause 4.19 *[Electricity, Water and Gas],* Sub-Clause 4.20 *[Employer's Equipment and Free-Issue Material],* Sub-Clause 17.1 *[Indemnities]* and Sub-Clause 17.5 *[Intellectual and Industrial Property Rights],* shall not exceed the sum stated in the Particular Conditions or (if a sum is not so stated) the Accented Contract Amount.

This Sub-Clause shall not limit liability in any case of fraud deliberate default or reckless misconduct by the defaulting Party.

Insurance

18.1

General Requirements for Insurances

In this Clause, “insuring Party” means, for each type of insurance, the Party responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause.

Wherever the Contractor is the insuring Party, each insurance shall be effected with insurers and in terms approved by the Employer. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Acceptance. This agreement of terms shall take precedence over the provisions of this Clause.

Wherever the Employer is the insuring Party, each insurance shall be effected with insurers and in terms consistent with the details annexed to the Particular Conditions.

If policy is required to indemnify joint insured, the cover shall apply separately to each insured as though a separate policy had been issued for each of the joint

insured. If a policy indemnifies additional joint insured, namely in addition to the insured specified in this Clause, (i) the Contractor shall act under the policy on behalf of these additional joint insured except that the Employer shall act for Employer's Personnel, (ii) additional joint insured shall not be entitled to receive payments directly from the insurer or to have any other direct dealings with the insurer, and (iii) the insuring Party shall require all additional joint insured to comply with the conditions stipulated in the policy.

Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage.

The relevant insuring Party shall, within the respective periods stated in the Appendix to Tender (calculated from the Commencement Date), submit to the other Party:

(a) evidence that the insurances described in this Clause have been effected, and
(b) copies of the policies for the insurances described in Sub-Clause 18.2 *[Insurance for Works and Contractor's Equipment]* and Sub-Clause 18.3 *[Insurance against Injury to Persons and Damage to Property].*

When each premium is paid, the insuring Party shall submit evidence of payment to the other Party. Whenever evidence or policies are submitted the insuring Party shall also give notice to the Engineer.

Each Party shall comply with the conditions stipulated In each of the insurance policies. The insuring Party shall keep the insurers informed of any relevant changes to the execution of the Works and ensure that insurance is maintained in accordance with this Clause.

Neither Party shall make any material alteration to the terms of any insurance without the prior approval of the other Party. If an insurer makes (or attempts to make) any alteration the Party first notified by the insurer shall promptly give notice to the other Party.

If the insuring Party fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contract, or fails to provide satisfactory evidence and copies of policies in accordance with this Sub-Clause, the other Party may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The insuring Party shall pay the amount of these premiums to the other Party, and the Contract Price shall be adjusted accordingly.

Nothing in this Clause limits the obligations, liabilities or responsibilities of the Contractor or the Employer, under the other terms of the Contract or otherwise. Any amounts not insured or not recovered from the insurers shall be borne by the Contractor and/or the Employer in accordance with these obligations liabilities or responsibilities. However, if the insuring Party fails to effect and keep in force an insurance which is available and which it is required to effect and maintain under the Contract, and the other Party neither approves the omission nor effects insurance for the coverage relevant to this default , any moneys which should have been recoverable under this insurance shall be paid by the insuring Party.

Payments by one to the other Party shall be subject to Sub-Clause 2.5 (Employer´s Claims) or Sub- Clause 20.1 (Contractor´s Claims), as applicable

18.2

Insurance for Works Equipment

The insuring Party shall insure the Works, Plant, Materials and Contractor´s Documents for not less than full reinstatement cost including cost of

demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 18.1 *[General Requirements for Insurances],* until the date of issue of the Taking-Over Certificate for the Works.

The insuring Party shall maintain this insurance to provide cover until the date of issue of the Performance Certificate, for loss or damage for which the Contractor is liable arising from a cause occurring prior to the issue of the Taking-Over Certificate, and for loss or damage caused by the Contractor in the course of any other operations (including those under Clause 11 *[Defects Liability]* and Clause 12 *[Tests after Completion]).*

The insuring Party shall insure the Contractor's Equipment for not less than the full replacement value, including delivery to Site. For each item of Contractor's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Contractor's Equipment.

Unless otherwise stated in the Particular Conditions, insurances under this Sub-Clause:

(a) shall be effected and maintained by the Contractor as insuring Party,

(b) shall be in the joint names of the Parties, who shall be jointly entitled to receive payments from the insurers, payments being held or allocated between the Parties for the sole purpose of rectifying the loss or damage,

(c) shall cover all loss and damage from any cause not listed in Sub-Clause 17.3 *[Employer's Risks],*

(d) shall also cover loss or damage to a part of the Works which Is attributable to the use or occupation by the Employer of another part of the Works and loss or damage from the risks listed in sub-paragraphs (c), (g) and (h) of Sub-Clause 17.3 *[Employer's Risks],* excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles per occurrence of not more than the amount stated in the Appendix to Tender (if an amount is not so stated, this sub-paragraph (d) shall not apply), and

(e) may however exclude loss of, damage to, and reinstatement of:

  (i) a part of the Works which is in defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (II) below),

  (ii) a part of the Works which is lost or damaged in order to reinstate any other part of the Works if his other part is in a defective condition due to a defect in its design, materials or workmanship

  (iii) a part of the Works which has been taken over by the Employer, except to the extent that the Contractor is liable for the loss or damage, and

  (iv) Goods while they are not in the Country subject to Sub-Clause 14.5 *[Plant and Materials intended for the Works].*

If, more than one year after the Base date, the cover described in Sub-paragraph (d) above ceases to be available at commercially reasonable terms, the Contractor shall (as insuring Party) give notice to the Employer, with supporting particulars. The Employer shall then (i) be entitled subject to Sub-Clause 2.5 [*Employer´s Claims*] to payment as the Contractor should have expected to have paid such cover, and (ii) be deemed, unless he obtains the cover at commercially reasonable terms, to have approved the omission under Sub-Clauses 18.1 (General Requirements for insurances).

18.3

Insurance against Injury to Persons and Damage to Property

The insuring Party shall Insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 18.2 *[Insurance for Works and Contractors Equipment])* or to any person (except persons insured under Sub-Clause 18.4 *[Insurance for Contractor's Personnel]),* which may arise out of the Contractor's performance of the Contract and occurring before the issue of the Performance Certificate.

This insurance shall be for a limit per occurrence of not less than the amount stated in the Appendix to Tender, with no limit on the number of occurrences. If an amount is not stated in the Appendix to Tender, this Sub-Clause shall not apply.

Unless otherwise stated In the Particular Conditions, the insurances specified in this Sub-Clause:

(a) shall be effected and maintained by the Contractor as insuring Party,
(b) shall be in the joint names of the Parties,
(c) shall be extended to cover liability for all loss and damage to the Employer's property (except things Insured under Sub-Clause 18.2) arising out of the Contractor's performance of the Contract, and
(d) may however exclude liability to the extent that it arises from:

  (i) the Employer´s right to have the Permanent Works executed on, over, under,
  in or trough any land, and to occupy this land for the Permanent Works,
  (ii) damage which Is an unavoidable result of the Contractor's obligations to execute the Works and remedy any defects, and
  (iii) a cause listed in Sub-Clause 17.3 *[Employer's Risks],* except to the extent that cover is available at commercially reasonable terms.

18.4

Insurance for Contractor´s Personnel

The Contractor shall effect and maintain insurance against liability for claims damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.

The Employer and the Engineer shall also be indemnified under the policy of insurance, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel.

The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works For a Subcontractor´s employees, the insurance may be effected by the Subcontractor but the Contractor shall be responsible for compliance with this Clause.

Force Majeure

19.1

Definition of Force Majeure

In this Clause, "Force Majeure" means an exceptional event or circumstance:

(a) which is beyond a Party's control
(b) which such Party could not reasonably have provided against before entering into the Contract
(c) which, having arisen such Party could not reasonably have avoided or overcome, and
(d) which is not substantially attributable to the other Party.

Fource Majeure may include, but is not limited to, exceptional events circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

(i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies
(ii) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war,
(iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel and other employees of the Contractor and Subcontractors,
(iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
(v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

19.2

Notice of Force Majeure

If a Party is or will be prevented from performing any of its obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

The Party shall, having given notice, be excused performance of such obligations for so long as such Force Majeure prevents it from performing them.

Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.

19.3

Duty to Minimise Delay

Each Party shall at all times use all reasonable endeavours to minimise any delay in the performance of the Contract as a result of Force Majeure.

A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

19.4

Consequences of Force Majeure

If the Contractor is prevented from performing any of his obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 19.2 *[Notice of Force Majeure]* and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 20.1 *[Contractor's Claims]* to:

(a) in extension of time for any such delay if completion is or will be delayed, under Sub-Clause 8.4 *[Extension of Time for Completion]* and
(b) if the event or circumstance Is of the kind described in sub-paraqraphs (i) to (iv) of Sub-Clause 19.1 (Definition of force Majeure) and, in the case of sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost.

After receivinq this notice the Engineer shall proceed in accordance with Sub-Clause 3.5 *[Determinations]* to agree or determine these matters.

19.5

Fource Majeure Aftecting Sub-contractor

If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in

this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor´s non-performance or entitle him to relief under this Clause.

19.6

Optional Termination, Payment and Release

If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been given under Sub-Clause 19.2 *[Notice of Force Majeure],* or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 *[Cessation of Work and Removal of Contractor's Equipment].*

Upon such termination, the Engineer shall determine the value of the work done and issue a Payment Certificate which shall include:

(a) the amounts payable for any work carried out for which a price is stated in the Contract;

(b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal;

(c) any other Cost or liability which in the circumstances was reasonably incurred by the Contractor in the expectation of completing the Works;

(d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and

(e) the Cost of repatriation of the Contractor's staff and labour employed wholly in connection with the Works at the date of termination.

19.7

Release from Performance under the Law

Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract entitles the Parties to be released from further performance of the Contract then upon notice by either Party to the other Party of such event or circumstance:

(a) the Parties shall be discharged from further performance without prejudice to the rights of either Party in respect of any previous breach of the Contract and

(b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under Sub-Clause 19 6 *[Optional Termination Payment and Release]* if the Contract had been terminated under Sub-Clause 19.6

Claims, Disputes and Arbitration

20.1

Contractor´s Claims

If the Contractor considers himself to be entitled to any extension of the time for Completion and/or any additional payment under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Engineer, describing the event or circumstances giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Engineer. Without admitting the Employer's liability, the Engineer may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all these records, and shall (if instructed) submit copies to the Engineer.

Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Engineer, the Contractor shall send to the Engineer a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

(a) this fully detailed claim shall be considered as interim;
(b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Engineer may reasonably require; and
(c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer.

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Engineer and approved by the Contractor, the Engineer shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time.

Each Payment Certificate shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

The Engineer shall proceed in accordance with Sub-Clause 3.5 *{Determinations]* to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8. 4 [*Extension of Time for Completion]* and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor falls to comply with this or another Sub-Clause in relation to any claim any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

20.2

Appoinment of the Dispute Adjudication Board

Disputes shall be adjudicated by a DAB in accordance with Sub-Clause 20.4 *[Obtaining Dispute Adjudication Board's Decision].* The Parties shall jointly appoint a DAB by the date 28 days after a Party gives notice to the other Party of its intention to refer a dispute to a DAB in accordance with Sub-Clause 20.4.

The DAB shall comprise, as stated in the Appendix to Tender, either one or three suitably qualified persons ("the members"). If the number is not so stated and the Parties do not agree otherwise, the DAB shall comprise three persons.

If the DAB is to comprise three persons, each Party shall nominate one member for the approval of the other Party. The Parties shall consult both these members and shall agree upon the third member, who shall be appointed to act as chairman.

However, if a list of potential members is included in the Contract, the members shall be selected from those on the list, other than anyone who Is unable or unwilling to accept appointment to the DAB.

The agreement between the Parties and either the sole member (“adjudication”) or each of the three members shall incorporate by reference the General Conditions of Dispute Adjudication Agreement contained in the Appendix to these General Conditions, with such amendments as are agreed between them.

The terms of the remuneration of either the sole member or each of the three members shall be mutually agreed upon by the Parties when agreeing the terms of appointment. Each Party shall be responsible for paying one-half of this remuneration.

If at any time the Parties so agree, they may appoint a suitably Qualified person or persons to replace any one or more members of the DAB. Unless the Parties agree otherwise, the appointment will come into effect if a member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment. The replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Sub-Clause.

The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both Parties, the appointment of the DAB (including each member) shall expire when the DAB has given its decision on the dispute referred to it under Sub-Clause 20.4 *[Obtaining Dispute Adjudication Board's Decision]*, unless other disputes have been referred to the DAB by that time under Sub-Clause 20.4, in which event the relevant date shall be when the DAB has also given decisions on those disputes.

20.3

Failure to Agree Dispute Adjudication Board

If any of the following conditions apply namely:

(a) the Parties fail to agree upon the appointment of the sole member of the DAB by the date stated in the first paragraph of Sub-Clause 20.2 *[Appointment of the Dispute Adjudication Board]*,

(b) either Party fails to nominate a member (for approval by the other Party) of a DAB of three persons by such date,

(c) the Parties fail to agree upon the appointment of the third member (to act as chairman) of the DAB by such date, or

(d) the Parties fails to agree upon the appointment of a replacement person within 42 days after the date on which the sole member or one of the three members declines to act or is unable to act as result of death, disability, resignation or termination of appointment,

then the appointing entity or official named in the Appendix to Tender shall, upon the request of either or both of the Parties and after due consultation with both Parties, appoint this member of the DAB. This appointment shall be final and conclusive. Each Party shall be responsible for paying one-half of the remuneration of the appointing entity or official.

20.4

Obtaining Disputer Adjudication Board´s Decision

If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Engineer, then after a DAB has been appointed pursuant to Sub-Clauses 20.2 *[Appointment of the DAB]* and 20.3 *[Failure to Agree DAB]* either Party may refer the dispute in writing to the DAB for its decision, with copies to the other Party and the Engineer. Such reference shall state that it is given under this Sub-Clause.

For a DAB of three persons, the DAB shall be deemed to have received such reference on the date when It is received by the chairman of the DAB.

Both Parties shall promptly make available to the DAB all information, access to the Site, and appropriate facilities, as the DAB may require for the purposes of making a decision on such dispute. The DAB shall be deemed to be not acting as arbitrator(s).

Within 84 days after receiving such reference, or the advance payment referred to in Clause 6 of the Appendix - General Conditions of Dispute Adjudication Agreement, whichever date is later, or within such other period as may be proposed by the DAB and approved by both Parties, the DAB shall give its decision, which shall be reasoned and shall state that it is given under this Sub-Clause. However, if neither of the Parties has paid in full the invoices submitted by each member pursuant to Clause 6 of the Appendix, the DAB shall not be obliged to give its decision until such invoices have been paid in full. The decision shall be binding on both Parties, who shall promptly give effect to it unless and until it shall be revised in an amicable settlement or an arbitral award as described below. Unless the Contract has already been abandoned, repudiated or terminated, the Contractor shall continue to proceed with the Works in accordance with the Contract.

If either Party is dissatisfied with the DAB's decision, then either Party may within 28 days after receiving the decision, give notice to the other Party of its dissatisfaction. If the DAB fails to give its decision within the period of 84 days (or as otherwise approved) after receiving such reference or such payment, then either Party may within 28 days after this period has expired, give notice to the other Party of its dissatisfaction.

In either event, this notice of dissatisfaction shall state that it is given under this Sub-Clause, and shall set out the matter in dispute and the reason(s) for dissatisfaction. Except as stated in Sub-Clause 20.7 *[Failure to Comply with Dispute Adjudication Board's Decision]* and Sub-Clause 20.8 *[Expiry of Dispute Adjudication Board's Appointment],* neither Party shall be entitled to commence arbitration of a dispute unless a notice of dissatisfaction has been given in accordance with this Sub-Clause.

If the DAB has given its decision as to a matter in dispute to both Parties, and no notice of dissatisfaction has been given by either Party within 28 days after it received the DAB's decision, then the decision shall become final and binding upon both Parties.

20.5

Amicable Settlement

Where notice of dissatisfaction has been given under Sub-Clause 20.4 above, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be

commenced on or after the fifty-sixth day after the day on which notice of dissatisfaction was given, even if no attempt at amicable settlement has been made

20.6

Arbitration

Unless settled amicably, any dispute in respect of which the DAB's decision (if any) has not become final and binding shall be finally settled by international arbitration. Unless otherwise agreed by both Parties:

(a) the dispute shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce,
(b) the dispute shall be settled by three arbitrators appointed in accordance with these Rules, and
(c) the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 *[Law and Language].*

The arbitrator(s) shall have full power to open up, review and revise any certificate determination, instruction, opinion or valuation of the Engineer, and any decision of the DAB, relevant to the dispute. Nothing shall disqualify the Engineer from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute.

Neither Party shall be limited in the proceedings before the arbitrator(s) to the evidence or arguments previously put before the DAB to obtain its decision or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the DAB shall be admissible in evidence in the arbitration.

Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Engineer and the DAB shall not be altered by reason of any arbitration being conducted during the progress of the Works.

20.7

Failure to Comply with Dispute Adjudication Board´s Decisin

In the event that:

(a) neither Party has given notice of dissatisfaction within the period stated in Sub-Clause 20.4 *[Obtaining Dispute Adjudication Board's Decision]*
(b) the DAB's related decision (if any) has become final and binding, and
(c) a Party fails to comply with this decision,

then the other Party may, without prejudice to any other rights it may have refer the failure itself to arbitration under Sub-Clause 20.6 *[Arbitration].* Sub-Clause 20.4 *[Obtaining Dispute Adjudication Board's Decision]* and Sub-Clause 20.5 *[Amicable Settlement]* shall not apply to this reference.

20.8

Expiry of Dispute Adjudication Board´s Appointment

If a dispute arises between the Parties in connection with, or arisinq out of, the Contract or the execution of the Works and there is no DAB in place whether, by reason of the expiry of the DAB's appointment or otherwise:

(a) Sub-Clause 20.4 *[Obtaining Dispute Adjudication Board´s Decision)* and Sub-Clause 20.5 *[Amicable Settlement]* shall not apply, and
(b) the dispute may be referred directly to arbitration under Sub-Clause 20.6 *[Arbitration]*

APPENDIX

General Conditions of Dispute Adjudication Agreement

1
Definitions

Each “Dispute Adjudication Agreement” is tripartite agreement by and between:

(a) the "Employer";

(b) The “Contractor” ; and

(c) The “Member” who is defined in the Dispute Adjudication Agreement as being:

(i) the sole member of the “DAB” (or “adjudicator”) and, where this is the case, all references to the “Other Members” do not apply,

or

(ii) one of the three persons who are jointly called the “DAB” (or “dispute adjudication board”) and, where this is the case, the other two persons are called the “Other Members”.

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the “Contract” and is defined in the Dispute Adjudication Agreement, which incorporates this Appendix. In the Dispute Adjudication Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2

General Provisions

The Dispute Adjudication Agreement shall take effect when the Employer, the Contractor and each of the Members (or Member) have respectively each signed a dispute adjudication agreement.

When the Dispute Adjudication Agreement has taken effect, the Employer and the Contractor shall each give notice to the Member accordingly. If the Member does not receive either notice within six months after entering into the Dispute Adjudication Agreement, it shall be void and ineffective.

This employment of the Member is a personal appointment. No assignment or subcontracting of the Dispute Adjudication Agreement is permitted without the prior written agreement of all the parties to it and of the Other Members (if any).

3

Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members (if any), any fact or circumstance which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

When appointing the Member, the Employer and the Contractor relied upon the Member´s representations that he/she is:

(a) experienced in the work which the Contractor is to carry out under the Contract,

(b) Experienced in the interpretation of contract documentation, and

(c) fluent in the language for communications defined in the Contract.

4

General Obligations of The Member

The Member shall:

(a) have no interest financial or otherwise in the Employer, the Contractor or the Engineer, nor any financial interest in the Contract except for payment under the Dispute Adjudication Agreement;

(b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Adjudication Agreement;

(c) have disclosed in writing to the Employer, the Contractor and the Other Members (if any), before entering into the Dispute Adjudication Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;

(d) not, for the duration of the Dispute Adjudication Agreement, be employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except as may be agreed in writing by the Employer, the Contractor and the Other Members (if any);

(e) comply with the annexed procedural rules and with Sub-Clause 20.4 of the Conditions of Contract;

(f) not give advice to the Employer, the Contractor, the Employer´s Personnel or the Contractor´s Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;

(g) not while a Member enter into discussions or make any agreement with the Employer, the Contractor or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing top act under the Dispute Adjudication Agreement;

(h) ensure his/her availability for any site visit and hearings as are necessary; and

(i) treat the details of the Contract and all the DAB´s activities and hearings as private and confidential , and not publish or disclose them without the prior written consent of the Employer, the Contractor and the Other Members (if any).

5

General Obligations of the Employer and the Contractor

The Employer, the Contractor, the Employer´s Personnel and the Contractor´s Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the DAB´s activities under the Contract and the Dispute Adjudication Agreement, and except to the extent that prior agreement is given by the Employer, the Contractor and the Other Members (if any). The Employer and the Contractor shall be responsible for compliance with this provisions, by the Employer´s Personnel and the Contractor´s Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member and the Other Members (if any):

(a) be appointed as an arbitrator in any arbitration under the Contract;

(b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or

(c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member´s functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he/she relieved from liability under the preceding paragraph.

6

Payment

The payment shall be paid follows, in the currency named in the Dispute Adjudication Agreement:

(a) a daily fee shall be considered as payment in full for:

(i) each working day spent reading submissions, attending hearings (if any), preparing decisions, or making site visits (if any); and

(ii) each day or pant of day up to maximum of two days travel time each direction for the journey (if any) between the Member´s home and site or another location of a meeting with Other Members (if any) and/or the Employer and the Contractor;

(b) all reasonable expenses incurred in connections with the Member´s duties, including the cost of secretarial services, telephone calls, courier charges, faxes and telexes, travel expenses, hotel and subsistence costs; a receipt shall be required for each item in excess of five percent of the daily fee referred to in sub-paragraph (a) of this Clause; and

(c) any taxes properly levied in the Country on payments made to the Member (unless a national or permanent resident of the Country) under this Clause 6.

The daily fee shall be as specified in the Dispute Adjudication Agreement:

Immediately after the Dispute Adjudication Agreement takes effect, the Member shall, before engaging in any activities under the Dispute Adjudication Agreement, submit to the Contractor, with a copy to the Employer, an invoice for (a) an advance of twenty-five (25) percent of the estimated total amount of daily fees to which he/she will be entitled and (b) an advance equal to the estimated total expenses that he/she shall incur in connection with his/her duties. Payment of such invoice shall be made by the Contractor upon his receipt of the invoice. The Member shall not be obliged to engage in activities under the Dispute Adjudication Agreement until each of the Members has been paid in full for invoices submitted under this paragraph.

Thereafter the Member shall submit to the Contractor, with a copy to the Employer invoices for the balance of his/her daily fees and expenses, less the amounts advanced. The DAB shall not be obliged to render its decision until invoices for all daily fees and expenses of each Member for making a decision shall have been paid in full.

Unless paid earlier in accordance with the above, the Contractor shall pay each of the Member's invoices in full within 28 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Adjudication Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the DAB; and without prejudice to the Employers rights remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in Sub-Clause 14.8 of the Conditions of Contract.

If the Member does not receive payment of the amount due within 28 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until until the payment is received, and/or (ii) resign his/her appointment by giving notice to the Employer and the Contractor. The notice shall take effect when received by them both. Any such notice shall be final and binding on the Employer, the Contractor and the Member.

7 **Default of the Member**	If the Member fails to comply with any obligation under Clause 4, he/she shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members (if any), for proceedings or decisions (if any) of the DAB which are rendered void or ineffective
8 **Disputes**	Any dispute or claim arising out of or In connection with this Dispute Adjudication Agreement, or the breach, termination or invalidity thereof, shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration.

Annex PROCEDURAL RULE

1 The Employer and the Contractor shall furnish to the DAB one copy of all documents which the DAB may request, including Contract documents, progress reports, variation instructions, certificates and other documents pertinent to the matter in dispute. All communications between the DAB and the Employer or the Contractor shall be copied to the other Party. If the DAB comprises three persons, the Employer and the Contractor shall send copies of these requested documents and these communications to each of these persons.

2 The DAB shall proceed in accordance with Sub-Clause 20.4 and these Rules. Subject to the time allowed to give notice of a decision and other relevant factors the DAB shall:

(a) act fairly and Impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case, and
(b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.

3 The DAB may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.

4 Except as otherwise agreed in writing by the Employer and the Contractor, the DAB shall have power to adopt an Inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor and the Engineer, and to proceed in the absence of any party who the DAB is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.

5 The Employer and the Contractor empower the Dab, among other things, to:

(a) establish the procedure to be applied in deciding a dispute,
(b) Decide upon the DAB´s own jurisdiction, and as to the scope of any dispute referred to it,
(c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Rules,
(d) take the initiative in ascertaining the facts and matters required for a decision,
(e) make use of its own specialist knowledge, if any,
(f) decide upon the payment of financing charges in accordance with the Contract,
(g) decide upon any provisional relief such as interim or conservatory measures, and
(h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute.

6 The DAB shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the DAB shall make and give its decision in accordance with Sub-Clause 20.4, or as otherwise agreed by the Employer and the Contractor in writing. If the Dab comprises three persons:

(a) it shall convene in private after a hearing, If any, in order to have discussions and prepare its decision;

(b) it shall endeavor to reach a unanimous decision: if this proves impossible, the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare written report for submission to the Employer and the Contractor; and

(c) if a Member fails to attend a meeting or hearing, or to fulfill any required function, the other two Members may nevertheless proceed to make a decision, unless:

(i) either the Employer or the Contractor does not agree that they do so, or

(ii) the absent Member is the chairman and he/she instructs the other Member to not make a decision.

INDEX OF SUB-CLAUSERS

BIDSF project D2

DECONTAMINATION OF THE PRIMARY CIRCUIT

H1 Technical Specification
(Doc.Id. D2-TS-PMU-07001-EN.rev3.valid)

CONTENT

DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A_{aver}	Average surface contamination
ALARA	As Low as Reasonably Achievable (optimization principle of radiation protection)
BIDSF	Bohunice International Decommissioning Support Fund
BOR	Tube Guide Block
Bq/cm^2	Becquerel per square centimeter (unit of surface contamination)
BWR	Boiling Water Reactor
CL	Cold Leg
DF	Decontamination Factor
DRF	Dose Reduction Factor
EBRD	European Bank for Reconstruction and Development
EU	European Union
FCC	Fiber Concrete Container
H&S	Health and Safety
H_3BO_3	Boric Acid
HDR	Reactor main flange sealing arrangement (from Slovak, *Hlavná Deliaca Rovina*)
HL	Hot Leg
HP	High Pressure
HSA	Historical Site Assessment
IAEA	International Atomic Energy Agency
ISFSF	Interim Spent Fuel Storage Facility
JAVYS a.s.	State owned company, current owner of A1 and V1 NPPs and RAW management facilities
KAZ	Core Basket
KoM	Kick-off Meeting
l (L)	Liter (unit of volume)
LILW	Low and Intermediate level wastes
LP	Low Pressure
m (mm, cm)	Meter (milimeter, centimeter) units of the length
MCP	Main Coolant Pump
MCR	Material Compatibility Report
MGV	Main Gate Valve
MPSVR SR	Ministry of Labour, Social Affairs and Family of the Slovak Republic
mSv/h	Mili Sievert per hour (unit of dose equivalent rate)
MV SR	Ministry of Interior of the Slovak Republic
MZ SR	Ministry of Health of the Slovak Republic
MZP SR	Ministry of Environment of the Slovak Republic
NIP	National Labour Inspectorate
NPP	Nuclear Power Plant

NPSH	Net Positive Suction Head
NRR	National Radwaste Repository
O&MM	Operation and Maintenance Manuals
P&T	Pressure and Temperature
PC	Primary Circuit
PMU	Project Management Unit for JAVYS BIDSF projects
PRZ	Pressurizer
PRZ-TK	Pressurizer Tank
PWR	Pressurized Water Reactor
QA	Quality Assurance
QAP	Quality Assurance Program
QCP	Quality Control Plan
RAW	Radioactive Waste
RCL	Reactor Coolant Loop
RCS	Reactor Coolant System
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RWCU	Reactor Water Clean-Up System
RWTC	Radioactive Waste Treatement Centre at Bohunice
SG	Steam Generator
SS	Stainless Steel
STN	Slovak Technical Standards
UJD SR	Nuclear Regulatory Authority of the Slovak Republic
UVZ SR	Public Health Authority of the Slovak Republic
V1 NPP	Bohunice V1 Nuclear Power Plant

1. INTRODUCTION

V1 NPP at Jaslovské Bohunice Site, located in the Trnava District in western Slovakia was finally shutdown in 2006 (Unit 1) and 2008 (Unit 2).

Activities related to V1 NPP decommissioning are performed through projects financed and co-financed by the BIDSF. The Fund was created on basis of the Framework Agreement between the Slovak Republic and EBRD from 16th November 2001.

Chemical decontamination of the reactor coolant loops prior to start decommissioning activities to reduce radiation exposures is a worldwide practice fully accepted by the regulators and successfully implemented in lots of nuclear facilities (Wuergassen BWR, Lingen BWR, Stade PWR in Germany; Haddam Neck PWR, Big Rock Point BWR, Maine Yankee PWR, Connecticut Yankee PWR in the USA; BR3 PWR in Belgium; José Cabrera PWR in Spain). Successful decontamination processes developed for decommissioning applications have reduced costs, reduced radiation exposure and provided additional options for the management of plant components (e.g. unrestricted release and recycle).

Based on the Report on Bohunice V1 NPP Decommissioning and Historical Waste Management Strategy, the suitability of decontamination of the primary circuit system prior to decommissioning was analyzed and this option was recommended to decrease dose rate and to make easier decommissioning activities.

2. OBJECTIVE

This document describes the extent of supply and the functional, performance and technical requirements of the primary system chemical decontamination to be performed at both reactor units of V1 NPP at Bohunice Nuclear Plant Site.

The objective of the decontamination project is to perform pre-dismantling chemical decontamination of primary circuits of both V1 NPP units to:

- Remove contamination from the primary circuit components to reduce dose levels around piping and equipment. Access to the installations is made easier this way, so that it becomes possible to use hands-on techniques for dismantling rather than the more expensive use of robotics or manipulators.
- Minimize the potential for spreading contamination during decommissioning activities.
- Reduce the contamination of components to such levels that they may be disposed of at a lower, and therefore more economical, waste disposal category.

The decontamination boundary will include the six Reactor Coolant Loops (RCL) of the Reactor Coolant System (RCS) for each one of the two reactor units. All major primary side systems, except for the reactor pressure vessel and the reactor internals, will be included in the decontamination flow path: steam generators, main coolant pumps, main gate valves, pressurizer, and primary coolant pipes.

Other auxiliary systems connected to the RCS (Primary circuit coolant purification system, Primary circuit normal refill system) remain operative and may be used by the Contractor in the decontamination process. Therefore, they may be used for the decontamination process, if the Contractor considers it advantageous to meet the decontamination targets.

At the start of the decontamination process, V1 NPP reactor units are defueled and control rod assemblies have been also removed. They contain only reactor internal parts and they are filled with demineralized water up to the Reactor Pressure Vessel flange (HDR). During the preparation of the decontamination the Reactor Pressure Vessel (RPV) will be by-passed/ isolated from the decontamination flow path and the reactor head and reactor internals will be removed from the RPV to facilitate the decontamination. If required, some demineralized water in the primary circuit will be drained during the decontamination preparatory activities.

As the place and equipment to locate the reactor internals in the reactor hall were designed to house only one set of reactor internals at a time, reactor units will be decontaminated one after another. Once finished the primary system chemical decontamination of the first unit, internals will be returned to the reactor vessel to leave place in the reactor hall to the set of internals of the second unit and start its decontamination process. Once completed the RCS decontamination of each V1 NPP reactor unit, reactor internals will be inserted back and reactor pressure vessel will be maintained with demineralized water up to just below cold nozzle level.

3. PLANT DESCRIPTION

3.1 BRIEF DESCRIPTION OF MAIN TECHNOLOGICAL CIRCUITS OF V1 NPP

V1 NPP is composed of two-unit reactor soviet-design WWER-440/V-230 commissioned in 1978 and 1980. Each one has a design electrical power of 440 MW_e.

Each unit has its own reactor built in a concrete shaft. The distance between reactor axes is 84 m. In Appendix 1, reactor-building plant view drawings show the arrangement (hatches, reactors, etc.) and areas in the reactor hall (Level +10.50 m).

Each reactor unit consists of the following main components:

- Reactor Pressure Vessel (RPV) 1 pc
- Reactor Coolant Loops (RCL) 6 pcs

  Components of one loop:

  - Hot leg (HL) with Main Gate Valve (MGV)
  - Cold leg (CL) with Main Coolant Pump (MCP) and MGV
  - Steam Generator (SG) 1 pc

All RCLs are identical except RCL No. 6 (Unit 1) and RCL No. 1 (Unit 2), to which PRZ is connected[1].

- Pressurizer system consists of:
  - Pressurizer (PRZ)
  - Pressurizer relief (blow-off) tank (PRZ-TK)
  - Safety valves
  - Pipework and valves

The following systems are auxiliary systems to the RCS of every unit:

- Primary Circuit Coolant Purification System – SOV / ČV.
- Primary Circuit Normal Refill and Boric Acid Regulation System – ND.
- Primary Circuit Emergency addition system – HD
- Air venting and drainage systems –DR

Following the most relevant data regarding the systems and components to which the decontamination is to be applied, as well as pertinent information related to the expected plant status at the time of commencement of the decontamination.

Appendix 1 includes some drawings of the main primary circuit components.

3.2 WWER-440/V230 MATERIALS

All surfaces of the primary circuit in contact with the primary coolant are either made from stainless steel (RCL, MCP, SG tubing, SG tube headers (collectors), MGV and auxiliary systems pipework) or from low alloy steel (reactor pressure vessel) or carbon steel (pressurizer, 22K carbon steel) welded with a stainless steel liner. All stainless steel components, pipework and the pressurizer liner are normally made from the Russian type titanium stabilized austenitic stainless steel 08X18H10T (08Cr18Ni10Ti - 0.08%C, 18%Cr, 10%Ni, 0.5%Ti - equivalent to type 321 SS).

The reactor pressure vessel is made from low alloy steel 15Cr2MFA (from Russian steel marking 15X2MΦA), weld clad internally with two stainless steel layers[2]. The inner layer is a non-stabilized stainless steel (Sv-07Cr25Ni13, similar to 309 SS) and that in contact with the coolant is a niobium stabilized stainless steel (Sv-08Cr19Ni10Mn2Nb equivalent to 347 SS).

The composition of the RPV steel used in the WWER-440/V230 of NPP V1 is given in the following Table 2. This information was used in the calculation of activated materials in BIDSF Project B6.4.

[1] In fact, RCLs are not identical because of different connections of Primary Circuit Emergency addition system (HD) pipelines

[2] Most WWER-440/V230 units (Novovoronezh 1 to 4, Kola 1 and 2, Kozloduy 1 and 2, Armenia 1 and 2 and Griefswald 1 to 4) do not or did not have clad reactor pressure vessels.

3.3 REACTOR PRESSURE VESSEL AND INTERNALS

3.3.1 Reactor Pressure Vessel

The reactor is formed by a vertical cylindrical pressurized vessel. The material of the vessel is low alloy steel coated by a 9 mm thick stainless steel liner.

RPV height is 11.8 m, the inner diameter is 3.56 m and the thickness of the cylindrical part is 14 cm.

The RPV head is bolted on to complete the vessel pressure boundary and serves to support and hold the control rod drives. 4 O-rings are used to provide a leak-tight fit between the reactor vessel and the reactor vessel head. The vessel has a large flange (HDR) to hold the studs.

The vessel is welded with circulation pipeline by 12 nozzles with a diameter of 0.564 m. Nozzles were manufactured by a process that uses a number of weld heads to cast the safe-end at the hole in the forging.

The reactor vessel is installed in a cylindrical reinforced concrete cavity called the reactor shaft, which constitutes a portion of the biological shielding surrounding the reactor vessel. This reactor shaft is also the inner boundary of the deck/pump compartment and of the below-deck inward continuation of the steam generator compartment. The primary circuit inlet and outlet pipes pass through penetrations in the shaft wall.

Control rod drivers and control rod cooling system are mounted on the reactor vessel head. RPV has a high protective cap over the control rod drives.

Drawings included in the CD-ROM attached to this Technical Specification show the RPV dimensions and the dimension and distribution of RPV perforations.

3.3.2 Reactor Internals

Reactor vessel internals include structures for control of coolant flow and supporting fuel assemblies.

The reactor internals include core barrel (reactor shaft + shaft bottom) (NP), core basket (KAZ), Block of Protecting Tubes (BOR). These elements will be removed from the RPV as part of the decontamination preparatory activities and will be not present during the decontamination.

The main structural material for most of the RPV internals is chromium-nickel titanium-stabilized austenitic steel (OCH18N12T).

3.4 REACTOR COOLANT SYSTEM

Six primary coolant loops have common flow paths through the reactor vessel.

Each reactor coolant loop includes:

- 1 Steam Generator
- 1 Main Coolant Pump
- 2 Main Gate Valve

- Main Circulation Pipes (hot and cold legs)

Reactor coolant flows from the reactor outlet nozzle through a MGV and main circulation pipes to the steam generator (hot leg). The primary coolant passes through the heat transfer tubes of the horizontal steam generator and is then pumped by the MCP through the MGV to the reactor inlet nozzle (cold leg). The Pressurizer maintains overall system pressure (12.25 MPa) and compensate for changes in the volume of the primary coolant. It is connected to the RCS between the reactor outlet nozzle and the outlet MGV in one of the loops. The Pressurizer is connected by two pipelines (2 x DN 200) with hot leg and by an injection pipeline (DN 100) with the cold leg of the main circulation pipe at the MCP discharge.

The main circulation pipes, MCP, MGV and SG for each loop are located within an enclosed vault. MGV serves to isolate the corresponding loop from the reactor.

The RCS total water inventory (one unit), in "solid" condition at the time of the decontamination (fuel excluded) has been estimated about 220 m^3.

The total surface of RCS wetted areas (one unit), in contact with RC, is estimated at about 17000 m^2. The steam generator tubes cover near 90% of total surface in contact with the coolant in the primary circuit.

3.4.1 Main Circulation Pipeline

One of the primary circuit components is the main circulation pipeline. The pipeline connects the reactor with main coolant pumps and steam generators.

Main gate valves are welded on the "hot" and "cold" parts of the main circulation pipeline.

The pipeline is manufactured from the stainless steel OCH18N12T. Internal diameter of the pipeline is 496 mm and the thickness is 34 mm. Elbow-pipe thickness is 52 mm.

3.4.2 Main Coolant Pump (MCP)

The GCEN-310 reactor MCP (see Appendix 1) is designed to circulate the coolant in the primary circuit of the NPP with WWER-440 reactor. The following auxiliary equipment is necessary for its operation: auxiliary circulation pump, fan, air cooler, autonomous circuit cooler, MCP support frame with spherical supports.

GCEN-310 is a vertical canned glandless single-stage centrifugal pump with a built-in squirrel-cage asynchronous motor. Separating the motor stator from the rotor chamber by a nichrome partition provides the pump unit leak proofness. Main coolant pump GCEN-310 is a low inertia pump.

GCEN-310 main characteristics are:

Pump Capacity	6500 – 7000 m^3/h
Coolant temperature	270ºC
Suction pressure	12.25 MPa
Pressure rise:	
Design discharge pressure	0.42 – 0.45 MPa

Design temperature	335ºC
Nominal Power consumption	2260 kilowatts
Motor speed	1470 rpm
Weight	
Stator, rotor, impeller, distribution system	28000 kg
Total	50200 kg

3.4.3 Main Gate Valves

Main Gate Valves of inner diameter 0.5 m are designed to separate the circulation loops from the reactor. They are opened remotely by an electromotor. The opening and closing of the main gate valves are finalized manually.

Main Characteristics of the MGV:

Nominal pressure	12.26 MPa
Nominal temperature	up to 300^{o}C
Nominal mass flow	6700 m^3/h.
Motor power	23 kW
Motor revolutions	1390 rev/min
Opening time - manual	30 - 40 min.
- electro-motor	up to 78 s
Closing time	the same as opening
Leakage through the seal	
- in open position	2 g/min
- in close position	3 g/min
Leakage rate	below 60 g/min
Max. allowable pressure difference	
- when it is allowed to open	0.98 MPa
- when closing	17.16 MPa

3.4.4 Steam Generator

The steam generators are horizontal vessels with submerged tube bundles and built-in steam separator. Each unit has a cylindrical horizontal shell (length 11800 mm, internal diameter 3210 mm and the thickness of the shell wall from 72 to 132 mm). The material of the vessel is carbon steel 22 K.

A support structure is installed in the location of the SG welded to the anchoring elements. Two primary collectors (hot and cold) and drainage pipelines are joined to the SG from the lower part of the shell. Feedwater line is joined to the SG from the side part of the shell. In two SG in each unit primary collectors are sealed by sealing made of expanded graphite.

The vessel is equipped by inspection manholes of diameters 712 and 500 mm.

5536 heat exchange stainless steel U-shaped tubes of □16 mm, 1.4 mm thick and up to 12500mm long, are welded to the central part of collectors. The tubing and tube spacers or supports are all fabricated of a titanium stabilized stainless steel similar to the US Type 321.

Steam generator is insulated by fibrous mattresses covered by glass cloth.

3.4.5 Pressurizer

The pressurizer (see Appendix 1) is a vertical cylindrical pressurized vessel dedicated to compensate coolant volume changes. Electric heaters in its lower section and a water spray nozzle in its upper section are used to automatically maintain pressure.

The pressurizer spray line originates at the cold leg of the RCS between the reactor vessel nozzle and main gate valve (loop 1 and 6, of Unit 2 and Unit 1 respectively). The pressurizer heaters are grouped in five banks. Spray flow and heaters are controlled by the pressure controller.

On the top of the vessel there are connected three safety valves that have two functions: first one is the protection against overpressure, and the second one is safety through the bleed and feed procedure. The exhaust of the safety valves passes to the pressurizer relief (blow-off) tank, under the water level. The lower part of the pressurizer is connected with two pipes to the hot part of the loop (1 and 6, of Unit 2 and Unit 1 respectively). Upper part is connected with a pipe to the cold part of the loop (1, 6). The inspection manhole of the pressurizer is located on the top of the vessel and has a diameter of 450 mm. There is a ladder installed in the pressurizer, for the performance of inspecting activities.

The pressurizer is welded from 4 steel rings and elliptic bottom and lid. The thickness varies from 153 to 204 mm. Material is the carbon steel coated by the stainless steel liner of 9 mm.

The height of the pressurizer is 10.86 m, including the nozzles. The internal diameter is 2396 mm. The total volume is 40 m^3.

3.4.6 Pressurizer Relief (blow-off) Tank

The pressurizer relief (blow-off) tank is a horizontal cylindrical pressurized vessel. It is dedicated to accept, capture and minimize the volume of steam-gas stream from the pressurizer.

The pressurizer relief tank is welded from 3 rings and two elliptic lids. The total volume is 15 m^3, the length 5.4 m and the diameter 2 m. The thickness is 10 mm.

3.5 AUXILIARY SYSTEMS

There are several auxiliary systems in WWER reactors. The following systems and facilities can be used in BIDSF project D2:

- Primary Circuit Purification System: 3 filters of active water treatment (ŠOV-1) (filters will be empty only with ceramsite layer) and regenerative heat exchanger and after cooler
- System of normal refilling: at least 2 pumps
- Pressurizer system: pressurizer heaters shall not be operated
- System of emergency refilling

- Ventilation system SV-12,62: exhausting
- Ventilation system SV-14,64: exhausting
- Interconnection of ventilation systems: exhausting
- Special sewage system
- Drain system and air vent system Sampling system
- service water system
- Scafander air
- Waste water cleaning system + evaporators
- Compressed air system
- Pure condensate system
- Heating steam and condensate of heating steam
- System for preparing reagents: tanks and pumps for solutions dosing
- Storing space for liquid RAW
- Deactivation system: demineralized water and tanks and pumps for mixing of decontamination solutions

A brief description of the most relevant auxiliary systems and equipment that can be used in the decontamination process is included in Appendix 2
APPENDIX 2. Operating schemes of the auxiliary systems are included in the CD-ROM attached to this Technical Specification. If required, additional information may be provided during the site visit or upon request during the Tender Process.

3.6 CURRENT PLANT CONDITIONS

Unit 1 of V1 NPP was finally shut down on December 31, 2006. The reactor was defueled in January 2008. The fuel was transported from the reactor spent fuel pool to the ISFSF in February 2009. The reactor contains only internal reactor parts. It is sealed, cleaned up and filled with demineralized water. Control rod assemblies were also removed to the storage for high level waste.

Unit 2 was finally shut down on December 31, 2008. The fuel was transported from the reactor spent fuel pool to the ISFSF in January 2011. The reactor contains only internal reactor parts. It is not sealed, the upper block is located on the HDR. Pressure vessel with loops is filled with demineralized water. All the RCS of V1 NPP to be decontaminated by the Contractor, as well as those parts of the auxiliary systems that can be included in the decontamination path, are located in the Reactor Building. The reactor hall is a spacious room in the controlled area of V1 NPP main production building (see Figure 8). The hall has several entrances, such as a door and a transport shaft. Both primary circuits and some components of auxiliary systems are located in the SG compartment. Access from the Reactor Hall to the equipment in SG compartment (R002) or to room R102 is through removable covers.

The reactor hall and surrounding rooms enable access to all main primary circuit components of both V1 NPP units. Dimensions of the hall (l x w x h) are 120x40x20 m. The reactor hall is equipped with transport shaft and three cranes (1x250/32/2 t and 2x32/8 t) enabling the transport of very large loads from/ to the train corridor under the reactor hall.

Other available ancillary systems are the following:

- Compressed air distribution is located in R002 and R102.
- Distribution of demineralized water is located in R002 and R102.
- For safety reasons, no electrical distributions are located in R002 and R102. For decontamination works, electric power supply is available through the welding network (32 A and 63 A plugs), which is located in the operational area or in its vicinity.
- Cooling – service water is located in R102.
- Connections to active drains are in R002 and R102.

In case of specific requirements for power supply and if the requirements are precisely defined, power supply can be provided from the existing switchboards in the reactor building by upgrading the electrical outlet from the switchboard (to be done by the Contractor) and installing an invoicing electricity meter with a lockable main switch taking into account the progress of decommissioning and changes in the V1 NPP internal consumption.

All main primary circuit components are in good condition, ready for pre-dismantling decontamination.

The bottom of both RPVs and their corresponding shaft bottom were cleaned for the last time in the period 18.02.2008-21.02.2008 for RPV at Unit 1 and 05.12.2009-10.12.2009 for the RPV at Unit 2.

Auxiliary systems and facilities which can be used in BIDSF project D2 (see section 3.5) are in good usability and reliable conditions, and they will remain operational during the whole decontamination time.

Energy and other utilities (e.g. technological water) supply are available for the decontamination as well as ventilation system according to the price list included in Schedule A-5 (Utility expenses).

Experienced operational personnel are available to support the project implementation.

Safety, operational and environmental documentation of the plant is available only for the successful Tenderer to facilitate the elaboration of engineering documents. It is available only in Slovak language.

3.7 PRIMARY SYSTEM CHEMISTRY

Water chemistry specification at Bohunice V1 NPP during normal operation is summarized in the following table.

3.8 SYSTEMS RADIOLOGICAL CHARACTERIZATION

3.8.1 Historical Radiological Data

Electrochemical samples were taken during refueling from inner surfaces of primary circuits of both units with the goal to measure the level and composition of radioactivity in surface contamination. 17 samples from 1st unit and 11 samples from 2nd unit were taken and measured during period 2000 – 2005. Averaged values of all measurements from this period and their essential analyses are shown in the following table.

The historical outside dose rates on the primary circuit loops vary from 0.07 to 0.9 mSv/h during the V1 NPP outages. The inside dose rates of drained steam generators vary from 2 to 30 mSv/h.

After final shut-down of V1 reactor units and the removal of reactor fuel from the RPV, dose rate measurements in contact with primary circuit 10 cm insulation have been conducted in four reference measurement points in each reactor loop to follow the progress of dose rates in the primary circuit of both units in the long-term (see Appendix 6).

3.8.2 Radiological Data from BIDSF B6.4 Project

As part of the BIDSF B6.4 project, an initial radiation survey was carried out from August to November 2009. Survey was based on direct measurements (dose rates, surface contaminations) and on sampling of outer and inner surface contamination in areas. Radiation survey was performed within as well as outside controlled area; it was focused to the places where radioactive contamination outside controlled area was supposed, based on V1 NPP Historical Site Assessment (HSA).

Results of BIDSF B6.4 project radiological characterization survey are included in Appendix 5.

3. DECONTAMINATION PROCESS

4.1 DECONTAMINATION TARGETS

The specific goals defined for the V1 NPP decontamination are listed below in the order of importance:

- The method applied by the Contractor shall be effective and high decontamination factors shall be achieved. The minimum Decontamination Factor (DF) for the SG Tube Bundle section shall be 100 and a minimum average decontamination (DF) of 30 shall be achieved for the rest of RCL components.
- The overall waste volume generated during the Decontamination process shall be minimized, consistently with the targets established for DF's and with the JAVYS criteria for transport, acceptance to the Bohunice RWTC and disposal at the National RAW repository in Mochovce.
- Worker radiation exposures during all phases of Decontamination shall be maintained as low as is reasonably achievable (ALARA).

- "Hot spots" in dead legs shall be prevented to the maximum possible extent, as well as the possibility of further contamination of relatively clean components or the presence of "loose contamination" in piping or equipment, after decontamination.
- The proposed decontamination scheme shall minimize the number of system modifications required, while achieving the required flow conditions and system line-up.

4.2 DECONTAMINATION BOUNDARY

The Contractor shall perform the decontamination of primary circuits of both V1 NPP units 1 and 2.

The decontamination boundary shall comprise:

- The six reactor coolant loops of the Reactor Coolant System (RCS) for each one of the two reactor units, excluding the reactor vessel and the reactor internals:
  - 12 Steam Generators (SG), including the collectors and tube bundles.
  - 12 Main Coolant Pumps (MCP).
  - 24 Main Gate Valves.
  - 2 Pressurizers (PRZ).
  - 2 Pressurizer Blow-off Tank.
  - Primary coolant pipes.

The reactor vessel and the reactor internals are not included in the chemical decontamination path.

The primary circuit volume excluding the RPV (for one unit) is about 150 m^3 and its surface is about 17000 m^2. Therefore, the overall treated surface will be about 34000 m^2.

The Contractor may consider the use of the auxiliary systems connected to the RCS (e.g. primary circuit purification system, primary circuit normal refill system, etc.) for the decontamination process and therefore their inclusion in the decontamination flow path (see section 3.5)

The Contractor shall take into consideration all lines connected to the decontamination boundary (e.g. air venting and drainage, inlet and outlet of SOV-1, inlet of safety injection system, etc.), in order to prevent uncontrolled leakage of radioactive substances or decontamination solution during the decontamination process of the decontamination boundary.

4.3 DECONTAMINATION CONCEPT

The following requirements and principles shall be applied to the decontamination concept to be presented by the Tenderer in its Technical proposal:

- The chemical decontamination process proposed by the Contractor shall be a multi-cycle/multi-step decontamination process, which shall provide a high decontamination factor with a minimum generation of final waste. If possible, the process should include a sub-process to minimize waste volume by decomposition of decontamination agents.
- Crud deposits, metal oxides together with the radioactive nuclides, deposited on wetted surfaces will be removed and dissolved. Dissolved deposits, including removed activity, and chemical agents residuals shall be trapped and retained on Ion Exchange resins. Use of resins filter cartridges should be optimized.

- In order to maximize flow rates and temperature throughout the different parts of the decontamination boundary, the concept shall consider utilizing the auxiliary systems hardware, as required during the different stages of the decontamination process, in addition to any contractor-supplied equipment (e.g. pumping, etc.) that may be required. To this end, the required support systems will remain operational during the whole decontamination time.
- Preparatory activities for the chemical decontamination process shall include the removal of the RPV head and reactor internals to facilitate decontamination activities. The RPV heads and reactor internals shall be put back in their places after the decontamination of the units.
- Radioactive waste generated in the decontamination process shall be transferred into the adequate transport containers to the Employer in a form compatible for their further treatment at the JAVYS Bohunice RWTC. The produced RAW shall meet JAVYS criteria for transport, acceptance to the Bohunice RWTC and disposal of the final product (FCC) at Mochovce National RAW repository (See Appendix 3).

- The final water inventory, once completed the decontamination, will be drained to the V1 NPP waste water cleaning system to be processed according to the existing JAVYS liquid waste processing system. Therefore, the Contractor shall assure that the residual water will meet the water quality specifications for their treatment at the plant waste water cleaning system.
- The Contractor shall finish cleaning the primary circuit from the remains of the decontamination solutions. This shall also include the cleaning and flushing of the RPVs if their initial conditions are affected as the result of the decontamination process and activities.
- Contractor supplied equipment used during the decontamination shall be decontaminated by the Contractor and shipped outside the plant, as shall be all the unused chemicals at the end of the operations. If the Contractor is not able to remove the equipment from the plant after the works are completed, he shall pay the cost related to its management as RAW according to the Price List of services included in Schedule A-5 (Utility expenses).

4.4 SYSTEM LINE-UP AND SYSTEMS MODIFICATIONS

In order to achieve the desired goals and taking into account the scope and requirements previously exposed in Sections 0 and 0, the following considerations will be taken into account:

- The Primary Circuit Purification System, Primary Circuit Normal Refill System and other parts of auxiliary systems (see section 0) remain operational and may be used in the decontamination process. Addition of the decontamination chemicals may also be accomplished using the plant systems.

According to the previous information and the data included in Chapter 9, the Contractor shall propose the most advantageous scheme of the system line-up and systems modifications to achieve the proposed decontamination objectives.

4.5 EVALUATION OF THE EFFECTIVENESS OF THE DECONTAMINATION PROCESS

4.5.1 Decontamination Factors (DF's)

The Contractor proposed process shall achieve maximum decontamination factors while maintaining to a minimum the generation of final processed waste volume, considering the waste acceptance and transport criteria required by JAVYS facilities and operating procedures.

Since it is expected that most of the deposited activity will be contained in the SG tube bundles, the proposed process shall be optimized for their effective decontamination. High DF for SG tube bundles will be required. It is also expected based on previous international decontamination experiences (Stade NPP, Connecticut Yankee NPP, Maine Yankee NPP, José Cabrera NPP) that the process may also result in satisfactory decontamination of the remainder of the RCS internal surfaces.

Therefore, two different targets have been established for the average DF's of separate areas of the decontamination boundary, which shall be bound. These targets are:

1. The minimum average DF for the SG Tube Bundle sections shall be 100.
2. A minimum average DF of 30 shall be achieved for each one of the following RCL components: (Primary Piping, Reactor Coolant Pumps, Main Gate Valves, Pressurizers, Pressurizer relief tanks).

In general terms, the DF in each control point shall be determined as the ratio between the contact dose rates before and after the decontamination, measured using shielded probes and at the same condition for the affected system [19]. Average DF's to be used for contractual purposes shall be determined using the arithmetic mean of the DF's achieved in the control points of each particular area. Average DF shall be confirmed by collecting sample (smear test) and their evaluation.

The number and location of the control points, as well as the procedures to be used in the contractual dose rate measurements will be jointly agreed upon by the Employer and the Contractor, with the following general criteria:

- The location of the control points shall be representative of the area and where possible, the dose rates shall be measured in contact with equipment external surfaces without thermal insulation and in locations with good access (e. g. not too far from inspection manholes).
- The total number of control points for each area shall be established depending on the extension of the surfaces and the initial dose rates. For each primary circuit component, a representative number of measurements shall be allocated. The Contractor shall propose an optimum number of control points.
- Standard reference points will be obtained from BIDSF project B6.4 – Decommissioning Database. In the set of control points, it will be also included the reference points on primary circuit loops where long term measurements are conducted (see Appendix 6). These data shall be provided by the V1 NPP Radiation Protection Department.

- The procedure for measurement shall be standardized, regarding such aspects as: position and aiming of the instrument, counting time, etc.
- Instruments with valid calibration should be utilized for the before and after measurements. The instrument used shall be able to maintain its calibration throughout the decontamination application.
- Geometry of each measurement shall be unambiguous: The same exact location shall be used for each before and after measurement. If possible, each location shall be marked so that, if necessary, a different person can perform a measurement in precisely the same location.
- Effectiveness of the decontamination shall be also assessed by measuring of dose rate on intercepting filters and by the amount of decontamination solution used.
- Methodology to make the samples to determine the DF shall be developed by Contractor. Samples will be made based on this methodology once it is approved by the Employer. The methodology shall explain how DFs will be determined and confirmed, after decontamination.

If measurement of dose rates on internal surfaces and samples from internal surfaces (smear test) of primary circuit components are accomplished by the Contractor, due to the time-consuming character of the measurements and in order to reduce personnel dose exposure, the number of measurements will be functional and ALARA. Taking samples from internal surfaces shall be brought, as minimum, in line with sampling and results of analyses performed within BIDSF project B6.4 – Decommissioning Database. After sample collection and their analysis the Contractor shall submit the samples to Employer.

In addition to the contractual dose rate measurements, teledosimetry measurements may be used by the Contractor to monitor the progress of the decontamination. To this end, a number of detectors with remote readout may be provided and installed by the Contractor at various critical locations, helping to maintain exposures as low as reasonably achievable (ALARA) by minimizing the need for routine operator staff rounds or radiation surveys after each decontamination cycle/step. These detectors do not need to be in direct contact with the pipe or equipment. Their outputs shall be used to evaluate the evolution of local Dose Reduction Factors (DRF's), which provide useful information about the final radiological conditions of each area. The corresponding remote radiation readings shall be logged hourly and periodic reports on the results of these measurements shall be handed to Employer designated Project Manager (Engineer).

4.5.2 Waste Production

The volume of solid waste produced during the process shall be reduced at the minimum consistent with the required DF's and other overall objectives.

The Tenderer, taking into account his experience and all the technical information included in this Technical Specification, shall propose in its Technical proposal an estimation of the solid waste volume produced during the decontamination. This volume shall include:

- The estimation of the oxide layers and base metal (if any) thickness expected to be removed by the proposed process in each type of material

- The ion exchange resins required by the process
- The filters used by the Contractor equipment, if any
- Technological and other miscellaneous wastes (e.g. tools, rags, cleaning solutions, etc.)

This estimation of the waste volume produced during the decontamination (expressed in m^3) shall be well-founded and fully justified.

The Contractor shall also report information about:

- Total volume of generated types of RAW.
- Total and specific activity of particular types of RAW .

The Contractor shall indicate the potential on-line activity control measures that may be required to guarantee that the generated spent resins, once conditioned, will comply with the activity limits in the waste acceptance criteria, while optimizing final waste volumes (see Appendix 3).

The Contractor shall also indicate the final water inventory, to be drained and processed in the V1 NPP waste water cleaning system, once completed the decontamination process. This water shall meet the relevant plant operational limits and conditions.

In order to guarantee that the final waste packages (fiber-concrete container-FCC) meet the acceptance criteria for their disposal at Mochovce National RAW repository, the Employer will process the waste generated in the decontamination process using the facilities under its administration. However, the Contractor shall bear the expenses related to transport, process and conditioning in the final waste package form according to the Price List of services included in Schedule A-5 (Utility expenses).

4. SCOPE OF THE WORK

The Contractor shall be responsible for all aspects of the chemical decontamination as identified in Chapter 3 of this Technical Specification, including compliance with appropriate Acts, Codes, Standards and Regulations. The Contractor shall perform the decontamination of primary circuits of both V1 NPP units 1 and 2 considering the following 4 Phases in the project:

PHASE 1: STUDY FOR DEFINITION OF PROCESS ENGINEERING AND DECONTAMINATION APPROACH

- Process Description, including proposed systems line-up and usage of existing plant equipment (if the latter is applicable). Proposed methodology for DF's determination, including the description of the associated hardware (e.g. detectors, Data Acquisition System, etc.) and software (e.g. measurement procedures, calculation method, etc.).
- Identification of Plant System's modifications required to perform the work.
- Description of all activities that arising from the realization of decontamination and assessment of all positive and negative impacts of those actions to environment.

- Thermo-hydraulic analysis assessing the feasibility of proposed process and systems line-up, regarding heating and flow conditions performance.
- Material Compatibility Report.
- Material Sample (Artifact) testing of samples representative of the materials under the decontamination scope to demonstrate the feasibility of the proposed process and adjustment of relevant parameters (e.g. number of cycles).
- Radwaste Evaluation Report.

PHASE 2: PREPARATION OF DETAILED DOCUMENTATION AND PROCEDURES

- Project Schedule.
- Safety Analysis Report.
- Risk Management Plan and Contingency Plans.
- Licensing Documentation for submission to the Employer for licensing purposes.

- Detailed Engineering Documentation: procedures, drawings, calculations, etc. according to detailed implementation programme(s).

PHASE 3: PREPARATION OF CHEMICAL DECONTAMINATION

- Procurement of consumables required for the connection and operation of the Contractor equipment and additional equipment required for the specific decontamination.
- Chemicals procurement and transport to the site, in accordance with the applicable quality certifications and transport safety regulations for hazardous materials.
- Contractor's decontamination equipment and personnel mobilization, including the decontamination equipment transport permit arrangements and personnel qualification according to V1 NPP requirements for external contractors.
- Qualification/ training of the personnel involved in the decontamination execution.

PHASE 4: ON SITE CHEMICAL DECONTAMINATION

The following operations shall be carried out for the decontamination of each V1 NPP unit:

- Removal of reactor head and reactor internals from the reactor pressure vessel and location in the projected places in the reactor hall.
- Installation and set-up of Contractor decontamination equipment at the Bohunice NPP site, including dump/sealing system for RPV by-pass and temporary connections to plant systems and energizing.
- Preoperational leak tests of all affected circuits, with inactive fluid and at operational P&T conditions, before actual decontamination starts.
- Withdrawal of the IAEA seal from Reactor Shaft Lid and the IAEA seal from transport corridor of 2. Unit.

- Decontamination operations, according to the proposed process, until the specified DF's are achieved, including control of the relevant process parameters.
- Connections to flushing lines, final flushing of affected systems including RPVs if their conditions are affected as the result of the decontamination process and activities, including specific treatment for dead-ends and localized hot-spots and draining the systems within the decontamination boundary.
- Checking of the fulfillment of the proposed DF's.
- Systems drainage and transfer the final waste water to the to the plant waste water cleaning system.
- Transfer of the solid decontamination waste in the required containers according to the type of waste for their further processing at the RWTC. o
- Inserting back reactor internals in the RPV and control the water level in the RPV to maintain the RPV filled with demineralized water to just below cold nozzle level,

These operations shall be carried out after the decontamination of both reactor units.

- Decontamination of Contractor supplied equipment to achieve the limits required for transport off-site.
- Transport of decontamination equipment off-site, back to Contractor's site.

As a conclusion of the project, the Contractor shall prepare a **Final Contract Completion Report (FCCR)** including the evaluation of overall decontamination performance, oxide layer composition and inventory of removed radioactive materials.

The Contractor shall submit design documentation in accordance with procedure JAVYS/14/SM-RD-02 Construction documentation management [16], Appendices K and L in appropriate scope.

The Contractor's scope of the supply shall also include the field supervision and technical direction of the execution of decontamination works under his responsibility and the licensing support to the Employer in front of the Slovak Regulatory Authorities.

5.1 STUDY FOR DEFINITION OF PROCESS ENGINEERING AND DECONTAMINATION APPROACH

5.1.1 Process Description, System Line-up and Usage of Existing Plant Equipment

With the Technical proposal, the Tenderer shall provide a **Description of the Decontamination Process** (**DDP**), providing detailed information about the proposed decontamination process, its physical-chemical basis and typical implementation characteristics, as well as the rationale behind its selection for the V1 NPP application, especially, about its capabilities to achieve the specified DF's. Examples from previous applications indicating plant type, methodology, activities, equipment used and results, DF reached, waste generated (including comparison between estimates and real production) shall also be provided by Tenderers in their Technical proposal.

The **Description of the Decontamination Process** shall include the Tenderer's system line-up proposal, explaining the basis with regard to the achievement of the specified decontamination

objectives, including how to deal with SG plugged tubes and other technical challenges. It shall also determine the Tenderer's position with regard to the use of existing plant equipment in the decontamination operations, as well as the systems, utilities or facilities required to support the decontamination operations. The proposal for the isolation of the RPV from the decontaminated primary circuit once finished the decontamination process to avoid re-contamination of the RCS shall be also explained.

DDP shall also provide the proposed methodology for calculating the final average contact DF, taking into account the criteria mentioned in Chapter 3 of TS. This will be used as the basis for discussion between the Employer and the Contractor to establish the agreed-upon final average DF for contractual purposes. For the final DF, it is expected that this will contain the desired number of monitoring points, their proposed location and the details of their measurement before and after the decontamination.

The Technical proposal shall contain information about the chemical substances or chemical products to be used, setting out their designation, specification of properties (above all in the form of "Safety Data Sheet") and estimated quantities necessary to be stored on the premises of Employer.

Detailed list and description of previous references for applications with similar scope in plants of similar design and vintage as Bohunice V1 NPP will be submitted also with the Technical Proposal.

Potential Employer's questions on the Contractor's technical solution will be discussed during the **Kick-off Meeting** and after their resolution the Employer will approve the proposed decontamination process and system line-up.

Preliminary information referenced in the **DDP** presented in the Technical Proposal shall be updated and consolidated in the **Process Design Report** (**PDR**) to be submitted within four (4) months from the Contract Commencement Date. PDR shall describe in detail the decontamination process description, the equipment layout, plant systems line-up and the required plant modifications, engineering of special devices for decontamination (modified valve internals, headers and collectors, special tools for handling, shielding, etc.), as well as the results of the required thermo-hydraulic calculations to determine the decontamination parameters and other performance analysis performed in support of the proposed operation.

5.1.2 Identification of Plant Systems Modifications

After the discussion during the **Kick-off Meeting** and the agreement on the proposed decontamination process and system line-up, the Contractor shall prepare and provide detailed engineering calculations assessing that the decontamination equipment connected to the plant systems will perform as required. These calculations may cover, but shall not be limited to, such issues as:

- NPSH calculations for operating pumps.
- Fluid flow, pressure and temperature conditions at the decontamination loops.
- Heating and cooling requirements to reach the desired process temperatures.

- Pressure drop through decontamination hoses and components.
- Chemical requirements.
- Quantity and quality requirements of liquid media (e.g. demineralized water for the preparation of decontamination solutions, etc.)
- The demands of the decontamination devices on power supply
- Ion exchange resin volume requirements and filter waste estimate.

Information from the NPP required to support these calculations will be provided by the Employer.

Based on the results of the above analyses and the proposed systems line-up, the Contractor shall also provide a **Systems Interface Analysis** (**SIA**) within two (2) months from the Contract Commencement Date, providing the basic design of the modifications required at the actual plant systems for their adequate performance during the decontamination process, as well as for their connection to Contractor's supplied equipment.

5.1.3 Material Compatibility Report

The Tenderer shall submit with the Technical proposal a preliminary version of the **Material Compatibility Report** (**MCR**), which shall include the results of analysis demonstrating the capability of the proposed decontamination process to achieve the specified DF's, as well as the compatibility with materials in wetted surfaces of the equipment and piping within the decontamination boundary. This **MCR** will ensure that the Tenderer's proposed decontamination will not cause a generalized degradation of the integrity of the plant systems and equipment included within the decontamination boundary, and will not induce or promote any kind of general or localized corrosion, in excess of that inherent to the own process normal parameters.

In addition, the **MCR** shall address the future functionality of the equipment included within the decontamination boundary that should remain fully functional after decontamination.

This preliminary version will be updated and consolidated in the revised MCR to be submitted within four (4) months from Contract Commencement Date. The revised **Material Compatibility Report** (**MCR**) will include relevant information regarding the actual chemicals and concentrations to be used during the decontamination, and their expect effect on the actual plant system equipment construction materials.

5.1.4 Material Sample (Artifact) Testing

The Contractor will demonstrate the effectiveness of the proposed process, establishing the thickness and composition of the different corrosion layers, as well as the effect of chemicals on the materials and on the trapped activity inventory according to the results of laboratory tests. Testing results will also be used for the preparation of the decontamination strategy (e.g. number and duration of cycles).

Contractor shall perform laboratory tests with samples of materials similar to the materials under the decontamination scope (artifacts) or may propose collecting artifacts from V1 NPP to carry out

the tests, if allowed by the Employer. The corresponding **Artifact Testing Report** (**ATR**) will be prepared by the Contractor and submitted to the Employer within three (3) months from the Contract Commencement Date.

5.1.5 Radwaste Evaluation Report

A **Radwaste Evaluation Report** (**RER**) including the estimation, by waste type, of the expected volume and total and specific activity for the solid wastes expected to be produced as result of the decontamination will be submitted within four (4) months from Contract Commencement Date. It shall also address the compliance of these wastes with the required Waste Acceptance Criteria.

5.2 PREPARATION OF DETAILED DOCUMENTATION AND PROCEDURES

5.2.1 Project Schedule

The Tenderer shall submit within its Tender, in Attachment 5 a **Preliminary Base Line Time Project Schedule**, which will be discussed during the **Kick-off Meeting.** Not later than four (4) weeks after the **Kick-off Meeting**, the Contractor shall provide the Employer with a detailed schedule with major milestones as part of project implementation in the detailed design.

The **Project Base Line Time Schedule** shall include, as a minimum, milestones for:

- Completion of all engineering documentation.
- Licensing process including submittal of the licensing and certification documentation
- Delivery at the NPP of all Contractor equipment and consumables required for the decontamination works and Contractor mobilization.
- Performance of the pre-operational leak/tightness tests
- Completion of systems decontamination phase.
- Completion of systems flushing and dead-ends and hot-spots treatment.
- Completion of radwaste management.
- Contractor equipment and left-behind consumables decontamination.
- Contractor equipment demobilization and off-site expedition.
- Final Report submittal.

5.2.2 Safety Analysis

As a part of the implementation documentation, the Contractor shall submit a **Safety Analysis Report** (**SAR**) where potential radiological and non-radiological risks to the workers or the public resulting from the decontamination process in all the decontamination phases, technical conditions/ operational limits for the execution of decontamination and a proposal of measures to eliminate them or to mitigate their consequences will be identified.

In particular, but not limited to, the Safety Analysis Report shall cover the following hazards:

- The risk of personnel contamination or accidental exposure
- The risk of a leak of radioactive substances to the working environment (a breach of the integrity of the decontaminated equipment)
- Failures of equipment related to the decontamination process (pump failures/malfunctions, plugging of technological lines, malfunctions of filtrating devices, etc.)
- Failures of power supply
- Leaks resulting from the application of aggressive decontaminating substances
- failure of physical barriers that prevent the spreading of decontaminating substances outside the decontaminated equipment (internal leaks)
- Fire and explosion hazards related to spent resins, chemicals spills and other conventional risks.
- Non-radiological risks associated with the storage and handling of chemical products, the handling of heavy loads in restricted spaces and risk of an electric shock.

In the hazard analysis the Contractor shall consider other possible risks or abnormal situations learned from previous experiences and the actions suggested preventing these situations.

For the hypothetical incidents causing off-site radioactive releases, the Contractor shall address the information required for the calculation of the doses to the public (duration of release, radioactivity released, physical and chemical form, etc.).

The Contractor shall develop safety measures independently for each action (set out in the programmes) according to internal JAVYS procedures and based on the Employer's basic requirements (Health and Safety according to JAVYS/14/SM-PR-04 [17])

The Contractor shall consider the results of project B6.3 "The V1 NPP Decommissioning 1st Stage Plan & Other Licensing Documentation", Deliverable D4 "Decommissioning 1st Stage Plan" in the development of the safety analyses.

5.2.3 Risk Analysis and Contingency Plans

In addition to the **SAR**, the Contractor shall also prepare and submit to the Employer prior to the start of the works a **Risk Management Plan** (**RMP**) covering the possible risks and situations that may result in non-satisfactory results for the application of the process threatening the success of the decontamination project. Examples of non-satisfactory situations are: the achievement of less than specified DF's by a large margin, delays in the project schedule, the spread of contamination to uninvolved systems or generation of new "hot-spots", volume of waste produced in the decontamination higher than estimated, etc. The contingency plans that he proposes to cope with all these eventualities, as well as an evaluation of their expected effectiveness shall also be addressed.

This evaluation shall be based on the Contractor's previous experiences in similar works and reference to these experiences and lessons learned will also be included in the Report.

5.2.4 Licensing Documentation

Responsibility regarding licensing process rests with JAVYS a.s. Nevertheless, the Contractor is responsible for the development of the documents to be submitted and/or approved by the Regulators (ÚJD SR, ÚVZ SR, MŽP SR and NIP) resulting from the obligations to develop the Scope of Work set by this Technical Specification.

The Contractor shall develop a **Licensing Plan** (**LP**) for the decontamination project, including the description of the essential licensing and certification activities and documentation that shall be performed by the Contractor to assist the Employer in obtaining the corresponding permits and licenses in compliance with Slovak regulations and codes (see Appendix 4) required for the implementation of the decontamination activities.

Modifications to existing plant equipment and systems shall also be carefully considered by the Contractor from the licensing point of view. These modifications shall be reflected in the analysis, and include whether modifications will affect nuclear safety pursuant to Section 2, item v) of the Act No. 541/2004 Coll. In this case, they require the approval of Nuclear Regulatory Authority.

The Primary Circuit boundary during Decommissioning 1st Stage is considered not to be a nuclear classified equipment pursuant to ÚJD SR Regulation 430/2011 Coll. However, decontamination of Primary Circuit should be considered in any case as a modification of nuclear facility with possible impact on nuclear safety pursuant to Section 2, item w) of the Act No. 541/2004 Coll. Therefore NRA SR shall be notified and provided with - for assessment - with the **Design Documentation of Modifications** (see Table 7) prepared by the Contractor in accordance with procedure JAVYS/14/SM-RD-02 Construction documentation management [16], Appendices K and L. This documentation shall be assessed in advance by the National Labor Inspectorate (NIP).

The Contractor during the preparation of D2 technical documentation shall develop the **Licensing Documentation** to be attached to the application for decision **pursuant to Appendix No. 2 IV and V, to the Act no. 355/2007 Coll.** [10], as described in section 0.All the documentation required to obtain the certification of the equipment brought to the plant to accomplish the V1 NPP Primary Circuit decontamination (see Chapter 7) shall be also developed by the Contractor.

The Contractor shall also provide full assistance to JAVYS a.s. for the purposes of obtaining equipment certification, permissions and authorizations, e.g. providing technical information and personnel support and attendance at meetings with the NIP (National Labor Inspectorate) and other Regulatory Authorities as determined by JAVYS a.s.

5.2.5 Engineering Documentation

The Contractor shall prepare and submit to the Employer the engineering documentation required by the Employer for a successful and timely execution of the project. These documents shall include the following:

1. Complete **Detailed Engineering Documentation** (**DED**) for his approval, including the procedures, drawings, studies, calculations and other documents associated with the different activities to be carried out for the decontamination activities.

   The list of procedures shall cover, at least, the following activities:

- Contractor equipment set-up (according to approved systems line-up/installation drawings).
- Routing, installation and connection of interface hoses to configure the defined recirculation/decontamination loops and by-pass RPV. The characteristics of the connection points to the Contractor equipment (e.g. flanges, electrical connectors, etc.) shall be identified.
- I&C devices and their location for best control of the decontamination process parameters, such as fluid flow, temperature and pressure, tank levels, contact gamma dose rate, etc.
- Contractor equipment Pre-*Operational Test Procedures (PTP)*, including a hydraulic test procedure to check the integrity of all recirculation loops, and the satisfactory operation of all the involved equipment and components as described in Section 0.
- Performance of the actual decontamination of the identified loops, including control of fluid flow and temperature, chemicals injection, duration and control for the different steps and the associated sampling and analysis requirements. On-line estimation of DF's, using teledosimetry or any other acceptable method that will be used to determine the actual duration of the different decontamination phases.
- Waste handling and conditioning.

- Contingency plans to cope such events as chemical spills, lack of tightness and process leaks, loss of power, loss of flow, loss of key services, and any other abnormal conditions which could occur during the application and may have an adverse effect on the performance or the rest of the Plant.
- Contractor equipment decontamination, dismantling and packaging for shipment off-site.

The drawings shall include, but will not be limited to:

- Contractor equipment definition drawings, including outline dimensions, weight, handling points, identification number of parts and parts list (as appropriate), specific placement and support requirements, etc.
- Process drawings identifying the different flow paths required for the decontamination process, as well as the connection points with the plant systems.
- Equipment arrangement drawings identifying the proposed positioning of the different modules within the plant.
- Temporary interconnecting piping runs from Contractor equipment to actual plant systems, including the required utilities and support systems.
- Electrical and I&C connections to actual Plant systems.

2. **Health and Safety Plan** (**H&SP**), as specified in Chapter 0.
3. Additional support requirements from plant services and staff (e.g. Health Physics Department services and monitoring equipment, Chemistry Department services and laboratory access, scaffolding, lifting & handling facilities, piping thermal insulation removal, communications, etc.).

5.3 PREPARATION OF THE CHEMICAL DECONTAMINATION

5.3.1 Procurement of Interfaces with Existing Systems and Other Consumables

Based on the **Systems Interface Analysis** (**SIA**), the Contractor will procure the temporary equipment, additional to the Contractor standard equipment that may be required for this specific application. This will include, but not will be limited to:

- Estimated quantities of hardware consumables (e.g., hoses, gaskets, fittings, sealing products, cabling, etc.), increased by a safety margin.
- Appropriate quantities of spare parts for the main Contractor equipment.
- Real time teledosimetry equipment.
- Temporary shielding that may be required by ALARA considerations, e.g. lead bricks or blankets, including a substantial safety margin.
- Any other miscellaneous additional equipment that may be required to install the Contractor equipment at the plant (e.g. dedicated equipment supporting or lifting fixtures) or to connect electrically the Contractor equipment to the plant AC distribution system (e.g. step-down transformers or frequency converters).

All the Contractor supplied temporary interface equipment shall have the required quality certifications that will be made available to the Employer on request. Procured consumables shall also comply with the applicable quality standards, as demonstrated by the accompanying certificates, and the procured inventory shall include an additional reasonable contingency margin.

Hardware consumables (e.g. hoses, gaskets, etc.) shall remain the property of the Contractor and shall be removed from the site by the Contractor at his expense.

5.3.2 Procurement of Chemical Products

The Contractor is responsible for the procurement of the estimated required quantities of chemical products to be used during the decontamination, increased by a reasonable contingency margin.

The Contractor shall submit to the Employer, for review and approval within eight (8) months from the Contract Commencement Date, a document on **Procured Chemicals and other Consumable Inventory** (**CCI**) containing the Relevant Inventory and Safety Information (cards of safety data (KBÚ)) for all Chemicals, etc. for use during the decontamination.

The Contractor's procured chemicals shall be accompanied by the applicable quality certifications. Transport and storage of the procured chemical products on the plant premises to the site will be made in accordance with the applicable Slovak Hazard Materials Transport regulations.

Contractor shall be aware that the quantity of chemicals to be stored at Employer's site shall be limited (see requirements pursuant to Act. No. 261/2002 Coll.). Employer is entitled to determine maximum quantity of individual kinds of chemicals localized on Employer's site.

5.3.3 Equipment and Personnel Mobilization

All required equipment and personnel shall be mobilized for arrival at site according to the project schedule. It is expected that the equipment, on arrival on-site will be handled by the Contractor's personnel.

The Contractor shall take into account in his Technical Proposal the provision of as many tools and auxiliary means that may be required for installation, set-up, operation, maintenance and repair of the Contractor equipment. The supplied equipment shall be of adequate quality and be in good operating conditions, according to the required quality Standards and Technical Delivery Conditions.

All instruments used for process control shall be confirmed. They will be checked and calibrated on site, before the start of the operations. The instruments used for measurement of process parameters of contractual relevance, e.g. radiation monitors used to determine DF's, shall be calibrated and certificated by a recognized certification agency/authority. The specific procedures covering the checking and calibration of this I&C shall be part of the overall decontamination process procedures.

5.3.4 Qualification/training of the Personnel Involved in Decontamination Operations

Coordination between the Contractor personnel and the Employer and commitment of the different plant departments in the project is very important to satisfactory performance of the decontamination activities.

Contractor employees will receive training to acquire or keep general capacity to enter, move safely and perform the works on the premises of the power plant. The condition of the performance of works by the Contractor is an on-site training on specific safety characteristics and risks of the workplace in question.

Professional training on a nuclear facility, its characteristics and professional activities related to the performance of decontamination works where impact on nuclear safety is established, shall be provided by the Contractor in a specialized facility and evidenced by a certificate of professional competency.

The required training and qualification of the Contractor shall be a condition required by the Contract, see part H5 of the Contract - Safety and Technical Conditions.

5.4 ON-SITE CHEMICAL DECONTAMINATION

Start of works (SW) on site is feasible only when the conditions for doing so are fulfilled (Phases 1-3) and Employer gives express written consent for such on site activities.

Equipment Installation and Set-Up

The Contractor's set-up crew will perform the following activities in order to prepare the decontamination equipment for the application:

- Reception of the equipment at V1 NPP site.
- Position the equipment at the designated locations inside the plant.

- Removal of reactor head and reactor internals from the reactor vessels and location in the foreseen place in reactor hall.
- Installation of the proposed sealing/dam system to bypass the reactor vessel.
- Hose layout and connection to both Contractor equipment and to the designated tie-ins for the plant systems within the decontamination boundary.
- Installation of the required temporary shielding around equipment and hoses.
- Installation of the required quick coupling for drains and vents.
- Connection of Contractor equipment to the required auxiliary services and utilities, including electrical and I&C systems.

The Contractor shall be responsible for erection and operation of the auxiliary equipment (hoses, cabling, lights, etc.) that may be required for the installation and set-up of the decontamination equipment brought to the site. Employer's Administrators of equipment involved in the process will participate and supervise the operation.

However, all existing plant lifting equipment that may be required for handling, erection and set-up (e.g. overhead cranes) of the Contractor's equipment shall be ensured by Contractor. Contractor shall either train the crane operators, or to solve the issue via subcontracting.

5.4.1 Pre-operational Tests

The Contractor shall perform pre-operational and leak tests of all affected circuits, with inactive fluid and at operational P&T conditions, before actual decontamination starts and by use of approved procedures. Non active fluid used in the pre-operational tests will become "active fluid"

A hydraulic test shall be conducted to check the integrity of all recirculation loops, and the satisfactory operation of all the involved equipment and components. The tests shall certify that the flow, pressure and temperature values are within the margins required for a successful application of the decontamination process. Leak tests shall also be performed during this hydraulic test to identify leakages from the primary circuit and Contractor's equipment to undesired spaces (e.g.: SG).

The Employer will review the pre-operational test plan and procedures and the Employer's personnel will participate in the pre-operational tests operating the required plant equipment, and transport means. Contractor shall operate lifting equipment.

Employer's Administrators of equipment will witness the pre-operational test.

5.4.2 Decontamination Operation

The Contractor's decontamination crew, or his sub-contractor personnel, will be responsible for the following during the performance of the decontamination:

- Operate the Contractor decontamination equipment according to the approved procedures.
- Control the decontamination process parameters to ensure that they are within the established limits at all times. These parameters include, but are not limited to:
    - System pressure and fluid temperature

  - Fluid flow through the different loops
  - Chemicals concentration
  - Fluid inventory
  - Gamma dose rate at selected locations

- Inject chemicals at appropriate times, according to the established decontamination process phases.
- Evaluate the evolution and effectiveness of the process taking regular samples of the circulating fluid and performing the necessary chemical and radiochemical analyses, and using on-line monitoring and assay systems.
- Interpret the results of the sample analyses and draw conclusions about adjustment of process conditions, supplementary chemicals additions, steps termination, etc.
- Identify any changes in the initial decontamination flow path that may be required, based on the actual decontamination process performance.
- Drainage to the V1 NPP waste water cleaning system of final water inventory once completed the decontamination.
- Transfer of the spent resins generated in the decontamination process to Contractor supplied spent resins storage tank and locate into the adequate transport container for their further treatment at the Bohunice RWTC . Flushing the systems within the decontamination boundary and the connected Contractor equipment with demineralized water and then draining the systems within the decontamination boundary.
- Inserting back reactor internals in the RPV, relocation of the RPV head and maintaining Reactor Vessel drained to just below cold nozzle level after decontamination.

- Isolation of the reactor loops from the RPV has to be performed to ensure leak tightness until the time when the RPV will be handled.
- Loops shall be decontaminated according to Contract requirements, flushed, emptied and isolated from the RPV.

The Contractor may use the support of existing functional equipment of V1 NPP as pumps, heaters, cranes, tanks, pipelines, radiation monitoring etc. Employer's Administrators of equipment and responsible for operations will participate in the operations (see Employer's Duties). Interfaces between the Employer and Contractor will be included in the **Interface Control Manual** (**ICM**) (see section 0).

The Contractor shall submit the decontamination procedures and the Operational and Maintenance Manuals to be applied during the performance of the decontamination for approval by the Employer.

After the decontamination of every unit, the Contractor shall issue a Decontamination Protocol stating that decontamination of the Unit (x), (where 'x' is 1 and 2) has been completed and contractual requirements were achieved. The protocols shall be approved by Employer.

5.4.3 Waste Handling and Conditioning

The removal, treatment and conditioning of all waste produced in the decontamination process is part of the project scope and the project price shall include management of produced radioactive waste until its final disposal.

In order to guarantee that the final waste packages (fiber-concrete container-FCC) meet the acceptance criteria for their disposal at Mochovce National RAW repository, the Contractor shall transfer the produced radioactive waste into the adequate transport containers according to the type of waste and hand over to the Employer in a form compatible for their transport to and further treatment and conditioning at the RWTC. Employer will treat and/or condition the waste generated in the decontamination process using the facilities under its administration in the Bohunice RWTC. However, the Contractor shall bear the expenses related to transport, treatment and/or conditioning activities in the RWTC according to the Price List of services included in Schedule A-5 (Utility expenses).

- Technological and other miscellaneous solid secondary waste shall be placed by the Contractor into 200L drums, sorted according to their further treatment (combustible, compactable, other) in compliance with PP U-038 (included in the CD-ROM attached to this Technical Specification). Expenses for transport and further treatment and conditioning for their disposal at Mochovce National RAW (incineration, compaction, cementation into FCC) will be bear by the Contractor according to the Price List of services included in Schedule A-5 (Utility expenses).
- Spent resins meeting the limits and conditions for the acceptance into the RWTC or the bituminisation line will be transferred into PK/SK containers and transported for their treatment and conditioning in the RWTC or the bituminisation line. The Contractor shall bring the equipment to pump the resins into Employer's containers. Contractor shall develop sampling analyses for every type of generated RAW waste to confirm the fulfilment of LaC for disposal at NRR at Mochovce.

- The Contractor shall remove the sludges and sediments generated during the flushing of RPVs. Sludges and sediments meeting the limits and conditions for the transport and acceptance in the RWTC will be transferred by the Contractor into the PKII/KALY container. The Contractor shall bring the equipment to pump the sludges and sediments into Employer's containers (see Appendix 3 for container description). Sludges and sediments not meeting the limits and conditions for the acceptance into the RWTC shall be filtered by the Contractor by suitable mechanical filters and put into Mogilnik in shielded hermetical case. If sludges are produced in the chemical decontamination of the primary circuit, they will be transferred to a PK II/KALY container by the Contractor with the same conditions as previously mentioned.

Final waste water shall be drained into the V1 primary circuit floor drainage and treated in the existing evaporator ČN 30. After water pre-treatment by evaporation, the resultant concentrates will be processed in Building 809 by means of bituminisation (max. salinity of the concentrate 190 g/litre, pH in the interval 10 – 11.5) into 0.2 m^3 drums or by means of cementation in bldg. 808 into FCC (salinity up to 400 g/litre, pH above 7). The processing mean will be decided by the Employer on the spot according to the parameters of the concentrate. The Contractor will bear the

treatment and conditioning expenses as Employer's service according to the Price List of services included in Schedule A-5 (Utility expenses).

The processed waste shall meet the RAW disposal criteria for the National RAW Repository in Mochovce. Processing, transport and RAW disposal are governed by relevant JAVYS waste management procedures. The waste shall be put into a transporting package form approved by the Nuclear Regulatory Authority (container – liquid RAW, drums for transport – capacity 0.2 m^3 solid RAW).

From the moment of taking over the waste from the Contractor, next waste management activities until their final disposal will be secured by the Employer as paid Employer's services based on the Contractor's requirements.

The Employer will designate a provisional laydown area in the controlled area for the waste generated during decontamination operations to be stored until they are transported. The non-active secondary wastes (electrical parts, ropes, covers, etc...) shall be released to the environment on the Contractor's expenses. However, the Employer is responsible to provide and bear expenses for free-release measurement of the waste.

5.4.4 Cleaning of Working Area and Transport of Decontamination Equipment Off-Site

After the completion of all decontamination works, the Contractor shall remove all his equipment and clean up the working area.

The Contractor's shipment of his equipment off-site will involve, at least, the following operations:

- Ensure that the equipment is completely drained and that the required degree of internal decontamination has been achieved during the final system flushing. In each reactor unit, final conditions of the system once completed the decontamination will be reactor internals inserted back in the RPV, Reactor Vessel filled to just below cold nozzle level and RPV closed with reactor head relocated.

- Disconnect and remove the different equipment skid units and prepare them for transport.
- Perform the necessary surface decontamination to meet any shipping requirements established by Slovak transport regulations.
- Make the necessary shipping arrangements and obtain the required permits and insurance.
- Transport back to Contractor's premises of all equipment and unused chemicals and other consumables. As a goal, the decontamination process will not result in any other radioactive wastes left-over for Plant disposal, than the process-generated ion exchange resins.

5.5 PREPARATION OF THE FINAL CONTRACT COMPLETION REPORT

The Contractor shall develop a **Final Contract Completion Report** (**FCCR**) summarizing the results of the decontamination works. This summary shall contain the evaluation of the overall decontamination performance including, as a minimum:

- Actual systems configuration during the decontamination process.

- Number of cycles and relevant cycle parameters.
- Decontamination Factors (DFs) achieved based upon the approved measuring points, and their evolution throughout the process.
- If employed, residual surface contamination on measured surfaces.
- Total activity removed from the affected systems.
- Actual volume of waste generated (e.g. ion exchange resins, sludge, used decontamination solution).
- Contractor should calculate the real production of non-active waste and their categorisation according to the Regulation No. 284/2001 Coll. that are produced during project implementation and the way to recover scrap value/disposal.
- Estimated affected systems residual contamination levels.
- The results of analyses to characterize from a chemical and radiological point of view, the material removed from the system's internal surfaces by the decontamination process.
- The analysis of radiation protection optimization in the case that limit doses stated by the ALARA committee were exceeded more than a 20%.
- Other information as agreed between the Contractor and Employer

5. FUNTIONAL, PERFORMANCE AND TECHNICAL REQUIREMENTS

6.1 REQUIREMENTS FOR MATERIALS, WASTE AND WATER CHEMISTRY

6.1.1 Materials Corrosion

The Decontamination process proposed by the Contractor shall not cause a generalized degradation of the integrity of the plant systems and equipment included within the decontamination scope, and shall not induce or promote any kind of general or localized corrosion, in excess of that inherent to the own process normal parameters.

The Tenderer shall include in its Technical proposal the preparation of a Preliminary **Material Compatibility Report (MCR)** which shall include, as described in Section 0., the analysis demonstrating the capability of the proposed decontamination process to achieve the specified DF's, as well as the compatibility with materials in wetted surfaces of the equipment and piping within the decontamination boundary.

Contractor shall perform corrosion tests with samples of materials similar to the materials under the decontamination scope or, if considered appropriate, with collected artifacts from V1 NPP (See Section 0)

The preliminary **MCR** shall be reviewed and updated by the Contractor as part of the detailed engineering documentation.

The Contractor shall provide the Employer with the documentation regarding the analysis eventually executed on samples. If the Contractor identifies problems regarding corrosion issues on any plant component, he shall address to the Employer his evaluations and he shall provide solutions to prevent the problems.

6.1.2 Water Chemistry and Radwaste

After decontamination process is completed, all system and components exposed to decontamination solutions shall be fully drained and flushed with demineralized water. Radiation conditions at the other PC systems and equipment shall not be deteriorated (activity must not increase) after decontamination.

After final flushing, the systems within the decontamination boundary shall be drained. Reactor internals will be inserted back and Reactor Vessel shall be maintained drained to just below cold nozzle level.

Connection points for power supply, demineralized water supply and other fluids and drains required for the decontamination will be supplied by the Employer, but the Contractor shall cover the cost of energy and water consumption according to the Price List of services included in Schedule A-5 (Utility expenses). Implementation of connections to flushing lines (e.g. necessity to modify the pipelines, systems, etc.) shall be ensured by the Contractor.

6.1.3 Solid Waste Characteristics

The Tenderer shall provide in its Technical proposal an estimate of the maximum expected (unconditioned) volume and characteristics of the final wastes generated during the decontamination process, as well as the expected inventory of activity removed from the plant systems.

This estimate will be based on the following parameters:

- Total wetted surfaces and internal volume of the systems included within the decontamination boundary.
- Results obtained during the artifact analysis, if available, or engineering judgment based on previous experiences.

The waste estimate, expressed in terms of m^3, will include all the produced waste, both primary (mostly spent ion exchange resins), and secondary process wastes (e.g. technological wastes, left-over temporary connections, etc.).

All activities needed for discharging (sluicing) the spent resins to the existing plant or Contractor supplied spent resins storage tank (so that it will be possible to pump with contractor pumping system to employer's determined equipment) will be included within the Contractor decontamination scope.

Transfer the decontamination waste in the required containers and meeting waste acceptance criteria for their further treatment at the JAVYS RWTC or BL is also included within the Contractor decontamination scope. Contractor may also decide to process the generated waste into a solidified form acceptable for their further conditioning in the final waste package (FCC) for disposal at Mochovce National RAW repository.

In addition, the Contractor shall bear the expenses related to transport, treatment and/or conditioning of the waste produced in the decontamination process according to the Price List of services included in Schedule A-5 (Utility expenses).

Solid secondary waste, placed in 200L drums and sorted according to their further treatment, shall meet Employer´s criteria for transport and admittance to the Bohunice RWTC.

Final waste water to be processed by evaporation in the plant waste water cleaning system shall meet the water quality specifications for their treatment in the plant evaporator (See Appendix 3).

Other requirements applicable to primary decontamination process wastes are not to produce toxic or dangerous airborne emissions.

The expected amount of technological and other secondary wastes will also be supplied by the Tenderer, based on the scope of the decontamination, the necessary connections layout and prior experiences. The breakdown of wastes by type, composition and expected contamination level shall also be supplied.

The Tenderer shall describe in its Technical proposal how the process will meet the above objectives.

The Contractor will update the estimate of waste provided in its Technical proposal in the **Radwaste Evaluation Report** (**RER**), as part of the detailed engineering documentation.

6.2 SAFETY REQUIREMENTS

6.2.1 Safety Analysis Report

The Contractor shall provide a **Safety Analysis Report** (**SAR**) as described in section 0

6.2.2 Radiation Protection

In this section the requirements on the project regarding radiation protection are described. The first part contains the requirements on the licensing process and licensing documentation, in the second part, requirements on the optimization of radiation protection in the project implementation phase are indicated, as part of the licensing documentation from the implementation phase. Requirements on ensuring radiation protection in the implementation of the project are also connected to the dose rate measurements and sampling to prove the efficiency of the decontamination project as stated in section 0.

Licensing

Decontamination of the primary circuit (as a whole) refers to §26, paragraph 2, letter b) of regulation no. 545/2007 Coll. [14], as an important technological or building modification regarding radiation-protection by virtue of which operational procedures are modified and conditions of actions leading to irradiation are changed. Pursuant to §26, paragraph 2, letter b) of regulation no. 545/2007 Coll. [14], it is the change of parameters of technological equipment and their material influencing the provision of radiation protection at workplace or its surroundings and, at the same time, pursuant to §26, paragraph 2, letter c) of the regulation no. 545/2007 Coll. [14] it is the change of the operational procedures in consequence of which the conditions of activity performance will be changed leading to exposure or changes in the level of radiation protection,

In the preparation process of technical documentation to the project BIDSF D2 is required the development of Licensing Documentation for the application for the Decision pursuant to Act 355/2007, on the protection, support and development of public health and on the alteration and

amendment to some acts Section, 13 (5) letter a) point 4 [10] (**documentation according to Appendix No. 2, items IV and V, to Act No. 355/2007 Coll.**). Contractor shall asses the influence of the change on the production of radioactive waste and on discharges into environment within the licensing documentation

The Contractor is responsible for the development of the Licensing Documentation and the Employer is responsible for the submission of the Application to the ÚVZ

Optimization of radiation protection (ALARA principle) in the project implementation phase

The requirement to optimize the activity leading to irradiation results from the second principle of radiation protection and the optimization requirements are defined in the relevant Slovak legislation (Act No. 355/2007 Coll., Government Order No. 345/2006 Coll., §8) [10]. The optimization is based on assumed individual and collective doses, on the impact of the activity on the production of radioactive wastes and on the discharge of radioactive substances into the environment. The selected Contractor shall proceed pursuant to the internal directive JAVYS/14/SM-RO-02 "Application of ALARA Principle", the meeting of which ensures the optimization of activities during all BIDSF D2 project implementation in the actual radiation situation at V1 NPP.

During the works in the controlled area of NPP, Contractor personnel shall meet in-plant quality procedures for the radiation protection, issuing from legislation of SR [10], [13] and [14]. Legislation of SR is pursuant to the basic international safety documentation published by IAEA [29].

6.2.3 Industrial Health and Safety

The works shall be executed in an effective and safe manner. Any personnel injury, plant damage and contamination spreading shall be prevented.

To this end:

- The Employer will provide the Contractor with information regarding generic risks at the plant and in the working areas and will promote the co-ordination and the co-operation on safety issues.
- The Contractor shall perform a specific risk assessment and shall prepare a **Health & Safety Plan** (**H&SP**) before starting any work at the site. This study shall list all identified potentials risk, as well as the prevention and mitigation measures planning to adopt.
- The H&S plan shall comply with the required specific Slovak regulations, as well as V1 NPP own regulations for on-site work.

6.3 EQUIPMENT REQUIREMENTS

The Contractor shall describe in its Technical proposal the proposed equipment and technology to be used for the decontamination implementation and justify that they are based on proven and licensed technology and shall be able to fulfill the project scope. He shall guarantee that the Contractor's equipment and the technology principle can be licensed in Slovakia.

Requirements established by UJD SR regulations 430/2011 Coll. "on requirements on Nuclear Safety," 53/2006 Coll. "which lays down details on requirements for management of nuclear

materials, radioactive waste and spent nuclear fuel" and 431/2011 Coll. on Quality Management System (in special, Appendices 5,6,7 and 8) shall be fulfilled.

Main attention shall be paid to industrial and radiation safety, discharges, decontamination waste and aerosols.

The Employer during the Contract implementation will provide to the Contractor (if required) connection points to the following systems:

- Electric power
- Lighting
- Compressed air
- Steam
- Demineralized water
- cooling water
- Drain services
- Vent system connection
- Any other deemed necessary by the Contractor to perform their activities, after mutual agreement.

The Contractor shall cover the cost of the energy, water consumption and other services according to the Price List of services included in Schedule A-5 (Utility expenses).

6.4 RELIABILITY REQUIREMENTS

The reliability of the Contractor's equipment shall be documented by the Contractor and shall be at least adequate to prevent industrial and radiological incidents. In addition, the reliability of the equipment shall guarantee that the project tasks will be executed in the time frame established in Section 0. A reference to successful result of the leak tests of all affected systems in the decontamination process shall be provided.

The equipment shall be proven and well adapted to the Employer properties (e. g. buildings, tanks, pipelines, usual activities).The designed life time of all parts of the equipment shall correspond to the project scope. It shall be described in the Technical proposal.

Plant systems and facilities that can be used in the decontamination will satisfy the usability and reliability conditions required for the project and those conditions will be maintained during the time of the decontamination project.

6.5 MATERIALS AND MANUFACTURING REQUIREMENTS

All technological equipment shall correspond to the decontamination requirements (safety, radiation protection, corrosion, erosion, decontamination ability, and minimization of secondary waste production) in accordance with legislation requirements listed in

Appendix .

The manufacturing shall be carried out in accordance with the Design Plan and the Quality Plan (see part H5 of the Contract - Safety and Technical Conditions).

6.6 PACKING, SHIPPING AND STORAGE REQUIREMENTS

The Contractor shall accurately identify each equipment item with sufficient information to allow positive identification during shop assembly and erection. Equipment labeling used in the operating schemes of V1 (Appendix 2) will be used in the Contractor documentation.

Once the Contract has been awarded, the Contractor shall give the Employer the number of parts, dimensions and weight of the total volume to be transported.

The Contractor shall indicate the shipping and storage requirements for the project implementation in its Tender proposal, Attachment 7 (if any). The shipping and storage support of the Employer will comprise reception of the shipments, indication of storage place and routes, and monitoring reception of materials and goods to site according to shipping lists. However, this Employer support is limited to the V1 NPP area.

6. PROJECT IMPLEMENTATION

7.1 GENERAL ARRANGEMENTS

Works shall meet the following requirements:

- For any construction, installation and operation works performed on the JAVYS, a.s. (V1 NPP) site, the Contractor shall observe all relevant instructions and rules applicable to this site (as specified in part H5 of the Contract - Safety and Technical Conditions .

- The design shall enable transportation of the equipment and its components using the existing transport corridors and its installation in the existing rooms without any need for enlargement of the rooms or transport corridors in the existing buildings.
- All equipment and systems shall be compatible with the existing JAVYS equipment and systems and shall interface to the existing equipment without limiting operation of the existing equipment.

The Contractor shall provide and cover all expenses in the case of temporary enlargement of the controlled zone and reverse exemption of the area. The Contractor shall fulfill all the requirements on nuclear safety, industrial safety and operation.

The Contractor shall hand over the decontamination RAW, resulting from the project implementation (direct and secondary waste), to the Employer, in terms of JAVYS processing rules.

7.2 RESPONSIBILITIES

The responsibilities of each one of the parties shall be as follows:

7.2.1 Employer Responsibilities

The Employer will be in charge of:

- Supply of applicable information regarding the plant, including drawings, material specification, isometrics, etc. required by the Contractor for the implementation of the decontamination activities. The Contractor will be allowed to access the Employer's archive exclusively for the needs of the project.
- The Contractor is requested to use all information provided in the Employer´s archive only for the purposes of the Project implementation and the Contractor is not allowed to submit these information to any other entity.
- Evaluate the Contractor decontamination proposed concept and the applicable technical requirements, time schedules, safety documentation, etc. and approve them once they meet Employer's requirements. Approval of any technical documentation, procedure, etc. by the Employer shall in no way relieve the Contractor from his responsibilities of successful performance of the project.
- Approve the Contractor's **Quality Assurance Plan**.
- Potential non-conformities or situations leading to non-satisfactory results of the decontamination project will be identified in the **Risk Management Plan** (**RMP**)).
- Carry out the required inspections and audits to the Contractor or any of his subcontractors.
- Approve the Final Contract Completion Report (FCCR).
- Perform on-site mandatory material reception based on shipping list and issue the corresponding expedition authorizations, for Contractor equipment.

- Supervise Contractor's activities with those of other external organizations involved in on-site activities.
- Provision of connection points to the electric power, lighting, demineralized water, cooling water, drain services, vent system connection and compressed air according with the Contractor requirements. However, the Contractor shall cover the cost of the consumption according to the Price List of JAVYS services included in Schedule A-5 (Utility expenses).
- Make the necessary arrangements to guarantee the access to the required plant services and utilities, as defined by the Contractor.

7.2.2 Contractor Responsibilities

The Contractor shall be in charge of:

- Supply the scope of services defined in this Technical Specification in strict conformity with the Contract stipulations, regardless of the Employer exercising his right to inspect, audit or witness any activity of the project. It includes the implementation of the plant modifications required by the decontamination concept, such as the installation of the required tie-in's at involved plant systems.
- The approval by the Employer shall not exempt the Contractor from his responsibility regarding the adequacy of the design and compliance with codes, standards or any other regulations and procedures applicable to the decontamination project.
- Obtain any required authorization that may be required to perform the activities within the scope of work of this Technical Specification, from the competent Slovak Regulatory Authorities.
- Develop and apply a Quality Assurance Plan (QAP) for all his activities, according to the specific requirements described in Section 0 and request and approve similar QAP's of any of his subcontractors.
- Notice the Employer of any non-conformity or incidence that may have occurred or expected to happen during the performance of the work, see part F of the Contract, sub-clause 8.3.
- Assign the staff and perform the required qualification and plant specific acceptance and instruction processes. This includes the procurement of any required visa or temporary work permits that may be required by the Slovak authorities.
- Passing the initial training on specific safety characteristics and risks of individual workplaces and site conditions required for the development of the works in the scope of the project.

Table 6 summarizes the main responsibilities of both the Contractor and Employer during the different project stages. Other responsibilities are recorded in the specific sections.

Table 6: Contractor's and Employer's main duties for this assignment

Contractor's Duties	Employer's Duties
Tender Proposal	

Technical proposal shall provide the so-called DDP (Description of the Decontamination Process) providing detailed information about proposed decontamination process like follows: • physical-chemical basis and typical implementation characteristics; • the rationale behind its selection for the V1 NPP application, especially, about its capabilities to achieve the specified DF's; • examples from previous applications indicating plant type, methodology, activities (e.g. plant modifications, others), equipment used and results, DFs reached, waste generated (including comparison between estimates and real production); • system line-up proposal, explaining the basis with regard to the achievement of the specified decontamination objectives, including how to deal with SG plugged tubes and other technical challenges; • Material list (chemical agents, equipment, protective clothes, etc.) including description and characteristics. • position with regard to the use of existing plant equipment in the decontamination operations, as well as the systems, utilities or facilities required to support the decontamination operations; • proposed hardware equipment for on-line monitoring of the effectiveness of the decontamination process; • proposed means for by-passing reactor vessel during the decontamination process and removal of reactor internals; • proposal for the isolation of the RPV from the decontaminated primary circuit once finished the decontamination process to avoid re-contamination of the RCS shall be also explained; • proposed methodology for calculating the final average contact DF, taking into account the	Evaluate the proposal. (Potential Employer's questions on the Contractor's technical solution will be discussed during the Kick-off Meeting and after their resolution the Employer will approve the proposed decontamination process and system line-up.)

criteria mentioned in Chapter 4 of TS; • Types, quantities and activity inventory (total and specific) of the all waste (spent resins, technological waste and miscellaneous) that will be generated as a result of performing the decontamination as specified in Section 4.5.2 and 6.1.3; • detailed list and description of previous references for applications with similar scope in plants of similar design and vintage as Bohunice V1 NPP will be submitted also with the Tender Proposal; • The Preliminary Safety Analysis, mainly based on previous Tenderer experience, covering the issues mentioned in Section 5.2.2; • The preliminary Material Compatibility Report (MCR), with the scope and contents identified in Section 5.1.3; • Tenderer personnel qualification records, in Attachment 8; • Tenderer Organization Chart proposed for the project, in Attachment 6; • Quality Assurance Documentation including information described in Section 7.8.2, in Attachment 7; • The Preliminary List of documents to be generated during the project; • The List of Exception(s)/Deviations to the present Specification, in Attachment 10; Preliminary information referenced in the DDP presented in the Technical proposal shall be updated and consolidated in the Process Design Report (PDR) to be submitted within four (4) months from the Contract Commencement Date.	
Project Management and Organization	
Organization of all meetings (site Kick-off meeting, follow-up meetings). Contractor will clarify in the KoM the realization of two workshops, one before implementation and the other one after implementation of the project.	Participation in all meetings.

The places of these meetings shall by agreed with Employer. The proposed place shall be outside the Employer's premises where he will make the presentation of the solution proposal (initial workshop) and achieved outputs (final workshop)	
Overall project co-ordination during all project phases and management of the Contractor-Employer Project interfaces through the upgraded *Interface Control Manual (ICM).*	Supply initially the *Interface Control Manual* to Contractor.
Development and update *of Integrated Base Line Time Schedule*, *Engineering Plan*, *Procurement Plan*, *Erection/Installation Plan*, *Testing, Commissioning* and O*peration Plan.*	Review of all Contractor's time schedules and plans.
Develop and apply a *Quality Assurance Plan* (*QAP*).	Approve the Contractor's *QAP.*
Obtain any required authorization to perform the activities within his scope.	Perform on-site mandatory acceptance and issue the corresponding expedition authorizations for Contractor equipment.
Promptly inform the Employer of any expected non-conformity or incidence during the performance of the work.	
Technical Documentation Preparation	
Preparation of all the technical documentation required for the project indicated in Table 7. (Implementation Documentation)	Supply of applicable plant information required for the decontamination implementation. Allow access to the Employer's archive exclusively for the needs of the project
	Review and approve any technical documentation issued by the Contractor relative to the decontamination project.
Provide technical support to the Employer during clarification meetings with regulatory authorities (including incorporation of comments to technical documentation).	Submission of all licensing documentation to regulatory authorities.
Procurement and Equipment/Personnel Mobilization	
Produce the document on *Procured chemicals and Consumable Inventory* for use during the decontamination.	Approval of the document on *Procured Chemicals and Consumable Inventory.*
Purchase of the chemical products, consumables and additional equipment required for the decontamination.	Carry out the required inspections and audits to verify the quality of the procured materials.
Packing and marking of the equipment.	Make the arrangements to guarantee the access to the required plant services and

Shipment and delivery of the equipment and materials to JAVYS Bohunice site. Personnel mobilization according to the project schedule and the rules for the execution of works in the Controlled Area. Contractor shall bring their own measurement devices for the media (water, electricity) they will consume during the implementation of the works on site. Employer will invoice consumption based on the readings. Devices shall be certified by Slovakian metrology service.	utilities. Provide to the Contractor an on-site training on specific safety characteristics and risks of an individual workplace and shall make him aware of specific site conditions.
Contractor shall ensure the transport means and lifting equipment and personnel to operate it for loading and unloading the equipment to and from the trucks and transport them into the controlled area and removed back to Contractor's premises.	
Decontamination Works	
Preparatory activities: removal of the RPV head and reactor internals, isolation of RPV from the decontamination loop, etc. Erection and set-up of the decontamination equipment in the designated location in the plant. Connection of Contractor equipment to the plant systems and eventual modifications of the connection points, tag - out and marking of the concerned systems – their disconnection, development of the documentation necessary for tag-out and disconnection of the equipment and systems according to the TAG-OUT principles. Manipulation with lifting equipment shall be ensured by Contractor. Contractor shall either train the operators, or to solve the issue via subcontracting. Mock-up training of personnel as required for high radiation tasks or any other risks activities requiring previous preparation. Conduction of pre-operational tests. Perform the decontamination work as described in this specification. Artifact Collection (when artifacts are not available) and contractor shall ensure activities, materials and equipment to make the sampling in the primary circuit. Remedy defects reported by Employer Replace reactor internals into the RPV and relocate RPV head. All modifications to primary system shall be after decontamination returned to	Operation of plant systems and equipment (systems opening and alike), operation of standard or installed Employer's transport means required for Contractor's equipment erection activities and set-up. (Contractor shall cover equipment operations cost according to JAVYS Price List included in Schedule A-5 (Utility expenses). Provision of connection points to the required plant auxiliary systems (Contractor shall cover consumption cost according to JAVYS Price List included in Schedule A-5 (Utility expenses). Supervise Contractor's activities with other external on-site activities. Carry out the required inspections and audits to the Contractor or any of his subcontractors. Defects Notification Approve each Unit Decontamination Protocol issued by Contractor.

its original status. In case of openings to the piping, the pipe shall be flanged or sealed. Decontaminate and remove Contractor's equipment and clean up the working area. Issue decontamination protocol for each decontaminated unit.	
Radwaste Management Activities	
Transfer of waste generated in the decontamination process to Employer into the adequate waste packages acceptable for transport and processing at RWTC, or Bear the expenses of waste transport, treatment and conditioning to its final disposal according to JAVYS Price List included in Schedule A-5 (Utility expenses). Decontaminate and remove Contractor's equipment and clean up the working area. Contractor shall bring equipment to pump resins, sludges and sediments.	Employer will transport and process waste at RWTC and plant equipment. (Contractor shall cover these operations cost according to JAVYS Price List included in Schedule A-5 (Utility expenses).
Develop Final Contract Completion Report (FCCR).	Approve Final Contract Completion Report (FCCR).

7.3 WORK ORGANIZATION

The Tenderer shall provide in its Tender Proposal, Attachment 6 the organization chart proposed for the Project, including both off-site support and field organization to co-ordinate and execute the on-site activities.

The scope of supply will include the field supervision and technical direction of the decontamination services. To this end, the Tenderer shall designate a unique responsible for the on-site activities that will interface with the representative for the decontamination project designated by the Employer.

The Tender Proposal, in Attachment 4 shall also include the list of proposed subcontractors that the Tenderer will subcontract if the Contract is awarded to him. The Contractor will retain full responsibility for the work performed by any of such subcontractors.

The Contractor shall send to the Employer the list of personnel previewed to perform the work, together with their qualifications and other required personal data, at least one (1) month in advance of the start of on-site activities. He shall also be responsible for securing all the required visas and other work permits for the proposed work team that may be required. The Contractor will also prepare, and send in advance, his forecasts about work assignments, by specialties, as well as for the work shifts to be established, to comply with the project schedule.

The Contractor shall have duly trained technical staff on site with experience in the type of work to be carried out, see also part F of the Contract, Sub-clause 6.9.

7.4 INTERFACE MANAGEMENT

The Contractor shall be responsible for management of the project interfaces.

In particular, the Contractor shall, as a minimum, identify all technical, operational and organizational interfaces necessary for successful project implementation.

The draft Interface Manual will be provided to the Contractor by the Employer. The Contractor shall be responsible for completion of this **Interface Control Manual** (**ICM**) and its continuous update. The completion and modifications of the Interface Manual shall be subject to the Employer's approval.

The Employer is responsible for interactions with the Regulatory bodies (e.g. ÚJD SR, ÚVZ SR), although the Contractor shall support these interactions.

7.5 OPERATIONAL CONSTRAINTS

The Contractor shall take into consideration operating requirements of JAVYS during the project implementation (e.g. sufficient radiation monitoring of JAVYS premises pursuant to internal JAVYS regulations).

The Contractor shall perform the works so as not to significantly interrupt the operation of the JAVYS systems.

The Contractor's staff shall observe the formalities regarding the access control, timetable and other time stipulations of presence on site that the Employer establishes, described in part H5 of the Contract - Safety and Technical Conditions.

7.6 QUALITY ASSURANCE

The purpose of this section is to define the requirements for the Contractor's Quality Assurance Plan, as well as to establish the responsibilities, interfaces and other aspects related to the execution of all phases of the V1 NPP decontamination project.

7.6.2 Quality Assurance Plan

The Contractor, within one (1) month after the Contract Commencement Date shall establish and submit to the Employer, for approval, a **Quality Assurance Plan** (**QAP**) which determines the policies, procedures and instructions for implementing the works under the scope of the project.

The **QAP** shall provide a detailed description of the following chapters:

- Introduction: describe the purpose, object and content of the Quality Assurance Plan;

- Range of project: describe the range of the BIDSF project. If the scope of the contract is procurement of works and goods, it is necessary to describe also the impact of the project on nuclear safety, radiation protection, the environment, job security, fire protection, metrology, specific equipment requirements, etc.;
- Responsibilities and authorities: describe the responsibilities and authorities of the individual members of the project on the side of the Contractor, including the organization structure and communication channels between individual members of the Contractor and Employer, who are the responsible persons for particular deliverables, including their contact information (telephone numbers, e-mail addresses);
- Requirements on the quality system of the Contractor:
    i. general requirements – compliance with ISO 9001:2008, if appropriate also with ISO 14001:2004 and OHSAS 18001:2007 if the Contractor has these systems incorporated and certified (include copies of certificates in the appendix)
    ii. documentation requirements
    iii. quality manual
    iv. control of documents
    v. control of records
- Other chapters in compliance with ISO 9001:2008 depending on the character of the BIDSF project: briefly define how the following is carried out within the project - resource management, realization of product, design and development (if applicable), purchasing, production and service provision, control of monitoring and measuring devices, measurement, analysis and improvement (customer satisfaction, internal audits, monitoring and measurement of processes and products), control of nonconforming products, data analysis, improvement (continual improvement, corrective and preventive actions) – define those parts that are applicable to the project.
- Source documentation
- Referring documentation
- Appendices
- List of project Technical Procedures.

Detailed requirements for the content of the project Quality Assurance Plan will be defined and submitted to the Contractor during the project Kick-off Meeting.

Any change affecting the documents comprised in the **QAP** shall be submitted to the Employer for its approval.

The Contractor shall ensure that each subcontractor either keeps an adequate in-house QAP or conforms to the applicable section of the Contractor's Quality Plan. The Contractor shall identify all the applicable QA requirements in the purchasing documents to its sub-suppliers so as to assure compliance with the Contractor's Quality Assurance commitments. This shall include audits, which the Employer will have a right to attend.

7.6.2 Quality Control Program (QCP)

Inspection Points Program (**IPP**), presenting a detailed sequence of inspection and test activities.

7.6.3 Non-conformities

The following will be considered as Non-conformities:

Variations affecting data, standards and/or requirements defined in the Contract provided they are not exceptions approved previously by the Employer before the award.

Significant repairs effected upon equipment in response to malfunction or damages during shipment.

Unacceptable leaks during the pre-operational hydro-test.

Non-conformities from the process parameters values expected during pre-operational tests.

Non-conformities from procedures during performance of tests or decontamination activities.

Non-conformities should be identified by the Contractor as part of his normal inspection and control activities. They may also be detected during the inspections performed by the Employer as part of the Inspection/Control Points Program or any other audits.

Should a Non-conformities be detected, the Contractor shall evaluate it, identifying the relevant root cause, and propose to the Employer the corresponding corrective action.

Components or equipment for which a Non-conformities has been identified, shall be put out of service and isolated, until the required corrective action is approved by the Employer and implemented.

All the documentation generated in relation with the Non-conformities and implemented Corrective Actions will be incorporated in the **Final Contract Completion Report (FCCR).**

7.7 PROJECT SCHEDULE

The proposed schedule for the decontamination project shall allow for the completion of all on-site activities before 18 (eighteen) months after the Contract Commencement Date (CD) and the submittal of final documentation, including **Final Contract Completion Report** will be available after 20 (twenty) months of the Contract Commencement Date. The equipment set-up and pre-operational leak test shall be completed within one (1) month since the start of works on-site (SW).

The Contractor shall develop, within its Tender Proposal, in Attachment 5, a **Preliminary Base Line Time Project Schedule**. This schedule shall include the milestones of the main project activities.

The Contractor shall attend a **Kick-off Meeting** at site with the Employer within two (2) weeks from "Contract Commencement Date". The engineering details of the Contractor's proposal will be reviewed along with the pertinent plant information. The proposed approach, required equipment,

station tie-ins, materials of construction, decontamination chemistry, waste produced, etc. will be discussed in as much detail as possible. Also organizational issues, interfaces between the Employer and Contractor and industrial safety obligations will be discussed.

After the **Kick-off Meeting**, the Contractor will provide the Employer with a detailed schedule with major milestones as early as possible. The Project schedule will include the following set of time schedules and Plans:

- **Base Line Time Project Schedule**
- **Detailed Design/Engineering Plan**
- **Licensing Plan**
- **Procurement Plan**
- **Erection/Installation Plan**, including milestones for the required plant modifications and for the delivery at the Plant site of all Contractor equipment and consumables required for the performance of the works
- **Testing, Commissioning and Decontamination Operation Plan**

The Contractor shall ensure that the above schedules/Plans are consistent. The schedules will be updated as required during the project to reflect any changes.

The **Project Schedule** shall identify timing of works on all main components and subsystems and show the activities of engineering, subcontracting, materials procurement, manufacture, shipment and arrival on site, construction, erection, testing and commissioning, main decontamination activities, demobilization, etc. so as to achieve all necessary administrative requirements. It will also include the approximate duration of the individual decontamination steps or phases. The Project Schedule should also indicate the critical path.

The Contractor, within eight (8) weeks after the Contract Commencement Date, shall submit to the Employer for approval, a **Detailed Design/Engineering Plan**. It shall identify all the main engineering and design activities, interfaces and the documents to be produced within the project, as defined in Chapter 4. The Contractor shall provide the schedule for dates of issue for each document, identifying if they require the Employer approval or are just for information purposes, in order to facilitate the Employer internal programming and resource allocation. The Contractor shall also submit within eight (8) weeks after the Contract Commencement Date" a **Licensing Plan** for the decontamination project as indicated in Section 0.

The Contractor, within four (4) months after the Contract Commencement Date", shall submit to the Employer for approval the **Procurement Plan**. It shall identify all supply (equipment, chemicals and other materials, consumables, engineering and field services etc.), required for the performance of the work, and the selected suppliers. The Contractor shall also include the schedule for the main phases of furnishing.

The Contractor shall also submit the **Erection/Installation Plan** and the **Testing, Commissioning and Decontamination Operation Plan**. These Plans shall indicate the major dismantling, plant modifications, erection (installation), testing, commissioning and decontamination implementation logic and duration of major activities, and shall be coordinated with the delivery dates of major components and systems and the start date of pre-operational test.

7.8 REPORTING

The Contractor shall submit to the Employer drawings, schedules, reports and other documents, as listed in Table 7, which indicates the submission schedule, language, the number of hard copies required, the document processing by the Employer (**"i"** for Information, **"r"** for Review, **"a"** for Approval).

7.8.1 Basic Requirements

The technical documents submitted to the Employer shall be in hard copy as well as in electronic format; the required formats shall be agreed upon during the **Kick-off Meeting**.

Any changes to the documents shall be controlled during the development of the project. All changes shall be approved by the Employer and shall be incorporated by the Contractor.

The Contractor shall provide all as-built documentation related to the equipment and systems associated with the scope of supply and to the connections with the plant current equipment.

At times determined by the Employer (usually on monthly basis) and to the content extent so specified, the Contractor shall provide schedules and progress reports.

7.8.2 Technical Data Required with the Tenderer's Technical Proposal

The Tenderer's Technical Proposal shall be the most comprehensive and detailed as possible, and shall address all the issues identified in the scope of work (Chapter 4). It will include, at least, the following:

List of references: The Tenderer shall submit with his technical proposal a list of similar services he has performed, which comparable object and scope to that covered by this Technical Specification.

A complete *Description of the proposed Decontamination Process* (DDP) as specified in Section 0 and the engineering principles proposed for the project implementation, including a justification for its expected effectiveness in the decontamination of V1 NPP primary circuits and realistic estimates for the DF's that may be achieved in different locations and equipment. This description shall also include:

- Material list (chemical agents, equipment, protective clothes, etc.) including description and characteristics.
- The proposed plant systems line-up, and will identify the preliminary location of the tie-in locations with the Tenderer equipment.
- The proposed means for by-passing reactor vessel during the decontamination process and removal of reactor internals
- Tentative locations for the Tenderer equipment inside the Reactor Hall, as well as any other space requirements for control stations, chemicals storage, spare parts, etc.
- A description of the proposed method and hardware equipment for on-line monitoring of the effectiveness of the decontamination process and for evaluating the contractual DF's.

A *preliminary Base Line Time Schedule* identifying the major project milestones (e.g., start of works on site, equipment set up and pre-operational tests, start and completion dates of the decontamination process and equipment demobilization packing and shipping), as specified in Section 0 (Attachment 5 of the Tender proposal).

Types, quantities and activity inventory (total and specific) *of the all waste* (spent resins, technological waste and miscellaneous) that will be generated as a result of performing the decontamination, as specified in Section 0. It shall also indicate the expected final waste volume for resins and resins filter cartriges as conditioned packages ready for their disposal at the regional RAW repository in Mochovce.

The number of persons working on-site and an estimate of the total amount of personnel radiation exposure to perform all of the on-site work at Bohunice V1 NPP, following the indications of Section 0 (Attachment 6 of the Tender proposal).

A *preliminary Safety Analysis*, mainly based on previous Tenderer experience, covering the issues mentioned in Section 0.

The *preliminary Material Compatibility Report* (MCR), with the scope and contents identified in Section 0.

An estimation of the required Employer's supplies and services or works (e.g. plant systems modifications, assembly-disassembly activities, heavy loads lifting and handling, scaffolding, operation support, water, electricity, transport, communications, etc.) (Attachment 7 of the Tender proposal).

Tenderer personnel qualification records. In general, Contractor personnel supervising the work should have three (3) or more years of experience in the field they are supervising. All Contractor personnel directing the chemical process shall have prior experience with nuclear chemical decontamination processes (Attachment 8 of the Tender proposal).

The *Tenderer Organization Chart* proposed for the project (Attachment 6 of the Tender proposal)

Additionally, the following Quality Assurance (QA) documentation shall be included in the Tenderer proposal (Attachment 7 of the Tender proposal):

- A preliminary QAP for the supply: Name, qualification and curriculum vitae of the Project key people shall be included in the QAP
- A preliminary Design Plan
- A preliminary QCP for the required fabrication and construction activities
- Preliminary Installation/Erection and Commissioning & Operation Plans in order to identify all main systems and sub-systems, installation, inspection, test and operational phases
- All the additional data to prove that the Tenderer Quality Policy fulfills the above-mentioned QA requirements

The Preliminary List of documents to be generated during the project

The List of Exception(s)/Deviations to the present Specification (Attachment 10 of the Tender proposal).

7.8.3 Inception Report

The **Inception Report** which shall indicate all main activities of the Contractor during the project execution which shall cover the following parts, as a minimum:

- The organizational structure of the project management, description of responsibilities and function, obligations of the Contractor's key persons
- Definition of tasks, responsibilities and interfaces among all the project participants
- Quality assurance program – a set of directives, working procedures and manuals for activities within the project, such as management, planning, project monitoring, coordination and management of interfaces, engineering, procurement, project implementation, risk management, quality audits, project documentation, identification system and elaboration of reports on the project status
- Project Risk Assessment with the identification of potential project risks during the project implementation
- Detailed Schedule of works

The **Inception Report** shall be submitted to Employer within one (1) month from the project Commencement Date.

7.8.4 Table of Technical Documentation Required with the Supply

The meaning of used abbreviations is the following:

CD for **C**ommencement **D**ate agreed in the Contract

KoM for **K**ick off **M**eeting

SD for **S**hipment **D**ate (departure from supplier for transportation to site)

SW for **S**tart of **W**orks on site

ST for **S**tart of Pre-operational **T**est

CT for **C**ompletion of Pre-operational **T**ests

a **a**pproval
r **r**eview
i **i**nformation

Table 7: Technical Documentation required with the supply

TECHNICAL DOCUMENTATION REQUIRED WITH THE SUPPLY			
Document Designation	**Employer Document Processing**	**Submission Date**	**Nr. of hard copies EN / SK**
1. Technical Documentation			
Inception Report (7.8.3)	r/a	CD + 1 month	4/6
Systems Interface Analysis (**SIA**) (5.1.2; 5.3.1)	a	CD + 2 months	4/6
Artifact Testing Report (**ATR**) (5.1.4)	c	CD + 3 months	4/6
Design Documentation of Modifications in the scope specified in the JAVYS/14/SM-ZM-01 procedure , Appendix B which shall comprise following documents:	a- by ÚJD a- by ÚVZ a- by NIP		
Process Design Report (**PDR**), including system line-up (0)	a	CD + 4 months	4/6
Material Compatibility Report (**MCR**) (Revised) (0)	r/a	CD + 4 months	4/6
Radwaste Evaluation Report (**RER**) (0)	r/a	CD + 4 months	4/6
Safety Analysis Report (**SAR**) (0)	a- by ÚJD	CD + 4 months	4/6
Complete Detailed Engineering documentation, including procedures, drawings, studies, calculations (5.2.6)	r/a	CD + 6 months	4/6
Health and Safety Plan (**H&SP**) (5.2.6, 6.2.3)	r/a	CD + 6 months	4/6
List of classified (according to ÚJD SR Regulation 430/2011 Coll.) and selected (technical devices) equipment (according to Decree of MPSVR[3] SR No. 508/2009), QA plans for equipment (according regulation ÚJD SR 431/2011 Coll.).	a- by ÚJD a- by NIP	CD + 6 months	4/6
Pre-operational Tests Procedures (**PTP**) (0, 9.2)	r/a	CD + 6 months	4/6
Documentation in compliance with the Act No. 355/2007 Coll.	a- by ÚVZ	CD + 6 months	4/6
Operation and Maintenance Manuals (**O&MM**) (5.4.3)	r/a	CD + 8 months	4/6
Risk Management Plan (**RMP**) (5.2.4)	r/a	–CD + 6 months	4/6
Procured chemical and consumable Inventory (**CCI**) (5.3.2)		CD + 8 months	4/6
Pre-operational Tests Report (**PTR**) (5.4.2, 9.2)	r/a	CT + 2 weeks	4/6
Final Contract Completion Report (**FCCR**) (0)	r/a	SW + 6 months	4/4
2. Project management documentation			
Preliminary Project Base Line Time Schedule (7.7)	r/a	Before KoM	4/6
Project Schedule (7.7)	r/a	KoM + 4 weeks	4/6
Interface Control Manual (**ICM**) (improved from the draft manual delivered by the Employer) (7.4)	r/a	CD + 2 months	4/6

[3] MPSVR SR - Ministry of Labour, Social Affairs and Family of the Slovak Republic

Detailed Design/Engineering Plan (7.7)	r/a	CD + 8 weeks	4/6
Licensing Plan (0)	r/a	CD + 8 weeks	4/6
Procurement Plan (7.7)	r/a	CD + 4 months	4/6
Erection/Installation Plan (7.7)	r/a	SW - 2 months	4/6
Testing, Commissioning and Operation Plan (7.7)	r/a	ST - 2 months	4/6
Updated Schedule and Progress Reports (7.8.1)[4]	r/a	Monthly	4/6
3. Quality documentation			
Quality Assurance Plan (**QAP**) (7.6.1)	r/a	CD + 1 month	4/6
Inspection Points Program (**IPP**) (7.6.1)	r/a	CD + 2 months	4/6
4. Certification of components (0)			
Conformity Certificates for the Slovak Republic	i	SD - 4 weeks	2/2
Documents for the customs exemption (to be agreed with the Employer)	i	SD - 8 weeks	2/2

7. CODES, STANDARDS AND CERTIFICATION

7.1. CODES AND STANDARDS

The decontamination of the V1 NPP primary circuits and related activities shall be carried out in accordance with the requirements and criteria specified in the Slovak legislative documents, standards and codes and another JAVYS specific regulations. The most relevant regulations for the project are listed in Appendix4.

Contractor shall meet all Employer and plant procedures applicable to the works under the scope of the project.

The specific legislation, related mainly to the security, safety, radiation protection and environment aspects, is specified in part H5 of the Contract - Safety and Technical Conditions. The legislation is only available in Slovak language.

Upon agreement with the Employer, EU standards/directives and recommended approaches, or other equivalent standards and regulations are allowed, if their requirements are equal to, or stricter than those set forth in relevant Slovak Technical Standards (STN); should the case arise, the Contractor shall provide to the Employer a proof of equivalence. The expenses for such demonstration of equivalence shall be borne by the Contractor.

[4] Progress Reports are not technical documentation

8.2 CERTIFICATION OF THE GOODS

In accordance with Slovak legislation, any equipment brought to the plant in order to accomplish the decontamination process under the scope of the project will be certified. The certification is performed by a relevant State Authority. The compliance of the characteristics of the equipment used with the specific requirements of the Slovak Republic will be checked at the stage of certification.

The certification is performed in accordance with Act 142/2000 Coll. on Metrology and on alterations and amendments to some Acts, as amended, and with SR Decree No. 508/2009 Coll., establishing details on ensuring safety and health protection in work with technical pressure, lifting, electrical and gas devices and determining technical devices deemed to be restricted technical devices.

The duration of the certification process depends on the scope of the supply. The certification Authority may require the performance of additional tests to confirm the characteristics of the Contractor's equipment.

The Contractor shall be responsible for certification/registration issues as well as for the application of standards that shall be complied with in order to obtain equipment certification.

8. TESTING AND ACCEPTANCE

9.1 GENERAL REQUIREMENTS FOR TESTING

The Contractor shall perform necessary testing to demonstrate the compliance of the delivered equipment with this Technical Specification and the requirements of applicable standards.

The Contractor shall provide all non-permanent instruments, equipment or materials required for performing the tests. These instruments, equipment and materials shall be removed from the site after the completion of the decontamination works.

All tested equipment shall be qualified and calibrated in accordance with the applicable standards.

9.2 PRE-OPERATIONAL TESTS

The Contractor shall perform pre-operational and leak tests of all affected circuits, with inactive fluid and at process P&T conditions, before actual decontamination starts and by use of approved procedures as described in Section 0.

The Contractor shall develop and supply the **Pre-operational Test Procedures** (**PTP**) as part of the Detailed Engineering documentation as indicated in Section 0. The Contractor shall develop the Program for the tests in the format (template) which shall be in compliance with the Employer QA requirements, indicating the extent and timing of pre-operational testing. The scope and methodology of the tests Program shall be agreed with the Employer.

A **Pre-operational Test Report** (**PTR**) shall be prepared by the Contractor and approved by the Employer to demonstrate that the decontamination equipment and line-up meets the requirements of this Technical Specification and are in agreement with all relevant Slovak standards.

9. OPERATIONS AND MAINTENANCE MANUAL

The Contractor shall submit for approval by the Employer **Operation and Maintenance Manuals** (**O&MM**) in both English and Slovak languages.

The O&MM shall include a comprehensive summary of all technical aspects of the equipment to be used for the decontamination implementation. It shall as a minimum contain:

- A functional description of the overall operations of the facilities.
- A functional description of all equipment and systems.
- Assembly/disassembly instructions.
- Operating procedures.
- Industrial and radiological health and safety instructions.
- Maintenance schedule.
- Maintenance instructions.
- Maintenance test/inspection procedures.
- Calibration procedures and recommended intervals.
- Repair instructions.
- Manufacturer's data sheets.
- General arrangement and cross-sectional arrangement drawings showing the as-built or as-supplied condition.
- Equipment statutory test certification.

10. REFERENCES

[1] The decommissioning of WWER type nuclear power plants. IAEA-TECDOC-1133, January 2000

[2] The V1 NPP Conceptual Decommissioning Plan. Project BIDSF B6.1, rev. 0, May 20

[3] The Updated Decommissioning Plan of A1 NPP, JAVYS, 2007

[4] Redevelopment of V1 NPP, DECOM, 2004

[5] BIDSF project C7-A – Metallic Waste Treatment. Preliminary study for definition of project scope, C7A-FS-PMU-08001, rev. 1, PMU BIDSF, 2006

[6] Laboratory verification of soft decontamination suitable for NPPs of WWER 440 type, VUJE, 1991

[7] Development of new improved and safe decontamination procedures, AllDeco, 2006

[8] Methods for the Minimization of Radioactive Waste from Decontamination and Decommissioning of Nuclear Facilities, IAEA 2001

[9] Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on alternations and amendments to some Acts as amended

[10] Act No. 355/2007 Coll. on Public Health Protection, Support and Development and on alternations and amendments to some Acts, as amended

[11] Act No. 311/2001 Coll. - Working Code as amended

[12] STN EN ISO 9001 - Quality management system. Requirements

[13] Government Order No. 345/2006 Coll. on basic safety requirements for health protection of the workers and general public against the ionizing radiation

[14] MZ SR Decree No. 545/2007 Coll., which lays down details on the requirements on provision for radiation protection in the activities leading to irradiation and the activities important from the viewpoint of radiation protection

[15] Limits and conditions for the National RAW Repository Operation (10/2004)

[16] JAVYS/14/SM-RD-02 Construction documentation management

[17] JAVYS/14/SM-PR-04

[18] 22212-GN1308-IN-05.000356.00035 Informe de cierre de los trabajos relativos a la descontaminación química de CN COFRENTES R15 2005. Rev 0

[19] EPRI Technical Report 1003391 Assessment of Cost Effective Technologies to Reduce Radiation Fields (2005)

[20] EPRI Final Report 1013510 Decommissioning Planning Experiences from US Utilities (2006)

[21] EPRI TR-112092 Evaluation of the Decontamination of the Reactor Coolant Systems at Maine Yankee and Connecticut Yankee (1999)

[22] EPRI 1013511 Connecticut Yankee Decommissioning Experience Report Detailed Experiences 1996-2006 (2006)

[23] EPRI 1011734 Maine Yankee Decommissioning Experience Report (2005)

[24] EPRI TR-106148 Shoreham Decommissioning: Project Summary and Lessons Learned

[25] EPRI 1003026 Decontamination of Reactor Systems and Contaminated Components for Disposal or Refurbishment (2001)

[26] Radiological aspects of a full-system decontamination of Loviisa 2 (Radiation Dose Management: Proceedings of the Conference Organized by the British Nuclear Energy Society and Held in Windermere, Cumbria, on 9-11 October 1995 Author British Nuclear Energy Society, British Nuclear Energy Society Staff)

[27] Technical Study of BIDSF D2 project - "Decontamination of the Primary Circuit", 200

[28] Ivan Smieško (NPP Bohunice). Factors influencing Dose Rate Build-up at Czech and Slovak NPPs. Proceedings of the International Conference of Water Chemistry of Nuclear Reactor Systems 8. British Nuclear Energy Society. 2000

[29] IAEA Safety Series No. 115 – International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, IAEA, Vienna, 1996

APPENDIX 2: DESCRIPTION OF SYSTEMS AND EQUIPMENT FOR POTENTIAL USE WITHIN THE PROJECT

Primary circuit coolant purification system – 3 empty filters ŠOV-1

The task of the cleaning ŠOV-1 is continuous purification of the primary coolant by ion exchanger filters with flow rate 20m^3/hour. Water for cleaning is taken from cold legs – discharge of the main circulation pump and the return of the water is from cold legs – suction of the main circulation pump.

More information in the following document: Operational procedure (unit 1 and 2): 1,2 -TPP-261 – descriptive part, scheme: 1,2 – PO-005.

System of normal refilling

The normal refilling system for the primary circuit serves for the charging of water to the primary circuit, charging of chemicals to the primary circuit and for pressure testing of the primary circuit and its parts. The system may be modified within project C7-A3. Each pump exerts pressure 15.7 MPa and flow rate 2.5 - 6 m^3/hour.

More information in the following document: Operational procedure (unit 1 and 2): 1,2 -TPP-259 – descriptive part, scheme: 1,2 – PO-006.

Pressurizer system (KO)

More information in the following document: Operational procedure (unit 1 and 2): 1,2 -TPP-251- descriptive part, scheme: 1,2 – PO-004

Ventilation system SV-12, 62

The purpose of the system SV-12,62 is to induce under-pressure (ca -200 Pa) in the sealed area and the rooms outside the sealed area, where there is a threat of back pressurizing from the steam generator box. In addition continuous purification of the atmosphere in the sealed area, in the case active aerosols occur. The system may be also used for non-standard sucking. The quantity of the sucked air depends on the specific setting of the system.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-265, scheme: 1,2 – PO-020.

Ventilation system SV-14, 64

The system serves for the suction from the sealed area (rooms R002 and the rooms for the operating staff of the reactor coolant pump and the loop isolating valve R102) in the mode or repair ventilation. The quantity of the sucked air depends on the specific setting of the system.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-265, scheme: 1,2 – PO-021.

Interconnection of ventilation systems

Interconnection of ventilation systems SV11, 61, 12, 62, 14, 64 and SV03 is concerned. If necessary, cooperation of the equipment of individual ventilation systems can be set. The quantity of the sucked air and the induced sub-pressure depends on the specific combination.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-265, scheme: 1,2 – PO-028.

Primary circuit floor drainage system

The primary circuit floor drainage system for waste water from the main production building and waste water processing ŠOV 3 serves for the collection of waste water. The system does not work independently, but together with the buffer storage of liquid waste system and the waste water treatment system (dry residues).

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-269, scheme: 1,2 – PO-025

Primary circuit air venting and drainage system

The air venting and drainage system serves for the air venting from the primary circuit during its filling, gas relief of the primary circuit, draining of the primary circuit and individual loops, controlled leakage removal, drainage of the pressurizer tank as well as air venting and drainage of other pipelines and devices of the primary circuit. As necessary, the water from drainage and air venting returns to the primary circuit or it is further collected and processed in the waste water treatment system.

More information in the following document: Operational procedure (unit 1 and 2): 1,2 -TPP-251, scheme: 1,2 – PO-001

Sampling system

The purpose of the sampling system is to take representative samples from all technological systems and equipment for the needs of conducting supervision of the chemical modes.

The sampling path starts at the nozzle of the sampling probe and ends in the sampling device (box, channel) leads a sample to the sampling point, reduction of sample's temperature and pressure and flow regulation.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-601, scheme: 1.2 – PO-026 a 1,2 – PO-027

Service water system – provision of the fluid

The service water system (service water (SW) and essential service water (ESW)) removes heat from the systems of both V-1 NPP units to the atmosphere. Pressure in the SW distribution lines is ca 0.6 MPa.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-352, scheme: 1,2 – PO-024

Pressure suit air – provision of the fluid

The system provides air for pressure suits in the case of adverse radiation situation which requires their use.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-265, scheme: 5 – PO-020

Waste water cleaning system + evaporators

The system serves for collecting, filtering and treatment of waste water.

The work of the system consists in the removal of water, condensate and drains to collecting tanks through the floor drainage system. Water from them is pumped over, filtered, if necessary, or pumped over by overflow through the tanks of the liquid waste buffer storage system, where dirt is sedimented in the waste water tanks of the ČN system. The water from the waste water tanks is processed in one of two legs of the evaporator stations. The evaporated solution is discharged to tanks in the liquid RAW buffer storage. The produced steam is removed to a condenser-gas remover, where it is condensed and gas is removed. The produced condensate is purified in fine cleaning filters and collected in checking tanks. After a radiochemical analysis is conducted, the purified water is led to the pure condensate tanks or may be discharged to the external sewage under precisely set conditions. If the water falls short of the standard, it is discharged from checking tanks to the waste water tanks to be purified again.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-269, scheme 5-PO–024-1, 5-PO-025

Compressed air system – provision of the fluid

The system serves for the supply and distribution of the compressed air around the primary circuit from the V1 secondary circuit compressor station. The pressure in the compressed air distribution system is ca 0.6 MPa.

More information in the following document: Operational procedure (common for unit 1 and 2): T-71.V1, scheme: 5 – PO-033.

Pure condensate system - provision of the fluid

The pure condensate system (demineralised water) serves for the distribution of pure condensate to individual consumers. Pure condensate serves for filling and cooling the equipment in the main production building and the auxiliary building. Pure condensate may be heated by a heater. The pressure in the pure condensate distribution system is ca 0.6 MPa.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-258, scheme: 5 – PO-034

Heating steam and condensate system – provision of the fluid

The system serves for steam distribution in the primary circuit and for heating of appliances. The supply of the steam is from the secondary circuit and the condensate is removed to the condensate collector tank.

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-362, 5 -TPP-363, scheme: 5 – PO-035, 1 – SO-021

Reagent preparation system – tanks and pumps for batching solutions

The system for preparing and batching chemicals, decontamination solutions and the solution of the boric acid is designed for the preparation of regenerating solutions for resin filters, to ensure the correct chemical mode in the running of evaporators ŠOV-3 (DTC 11.3), to ensure the required chemical composition of the primary circuit charging waters and for the preparation, heating and transport of decontamination solutions for the DZ system (TC 13).

More information in the following document: Operational procedure (common for unit 1 and 2): 5 - TPP-271, scheme: 5 – PO-036.

Buffer storage for liquid RAW

The buffer storage for liquid RA waste is designed for the receipt, storage and transport of radwaste produced in the operation of the NPP. The system is further designed for the homogenisation, heating, pumping over and transport of the liquid RAW.

For the storage of liquid radwaste (from the viewpoint of specific activity and composition) a special buffer storage for high-level waste (tanks made of stainless steel), for low-level waste (reinforced-concrete compartments lined with stainless steel) and for active concentrate from the evaporators - DTC 11.3 (tanks made of stainless steel) are used.

Pumping over of the liquid RAW to a transport container is carried out in the room of the pumping station, from this point the transport of the container is carried by means of a specially modified transport vehicle.

More information in the following document: Operational procedure (common for unit 1 and 2): 5-TPP-268, scheme: 5 – PO-037, 5 – PO-038, 5 – PO-039, 5 – PO-039-01.

Deactivation system – provision of the fluid-demineralised water and the tank and pump for the preparation of decontamination solutions

The system serves for deactivation – decontamination of rooms and technological equipment. The deactivation is carried out by means of hot condensate, acid and basic deactivation solutions. Deactivation of the equipment is carried out in deactivation baths and special boxes.

More information in the following document: scheme: 5 – PO-040, 5 – PO-041.

LISTING OF EQUIPMENT LABELLING USED IN THE OPERATING SCHEMES OF V1

RE	Reactor
PG	SG
RE	MCP
SA	MGV sealing system
RE	Primary Circuit pipes
KP	PRZ
ČV	PC purification system
ND	PC normal refill and boric acid regulation system
BA	System for cooling the water of spent fuel pool and transport pool
ČK	Condensate purification system
BK	Borated condensate system
DR	PC drainage system
TV	Service water system
N	Nitrogen system

V	Compressed air system
OV	Sampling taking system
SV	ventilation - exhaust system
SP	ventilation - intake system
SR	ventilation - recirculation system
ČD	PC drainage purification system
ČN	Non-organized leaks purification system
M	Blowcase system (systém monžíka)
ČB	System to purify the water of the at reactor spent fuel pool and transport pool
ČS	SG purge purification system
RB	System to regenerate (recover) the boric acid
PR	System to prepare reagents and deactivation solutions
DZ	Deactivation system
SS	Spray system
HD	Safety injection system
SS	System of safety valves of hermetic compartments
MČ	MCP Intermediate circuit system
MS	RPS (reactor protection system) intermediate circuit
PG	SG purge and drainage system
ZT	Radioactive waste storage
ŠH	Special canalization (sewage) from the MPB (Main production building)
ŠŠ	Special canalization (sewage) from the BPP (auxiliary building)
BO	System of the water of the biological shielding
PK	System of steam and condensate of heating steam
PV	Fire protection water system

For Process Diagrams of RCS and Auxiliary Systems, please, refer to CD-ROM adjoined to this Technical Specification.

APPENDIX 3: WASTE ACCEPTANCE CRITERIA

A3.1 WASTE ACCEPTANCE CRITERIA FOR RWTC

It is necessary to sort RAW (mostly solid RAW) pursuant to waste catalogue U-38 "Waste catalogue of radioactive waste for their processing in JAVYS, a.s.", and accordingly also mark RAW (in drums - solidified, combustible, compactable,...) (see file on CD: U-38 Vyd4.Rev.c.1.doc)

At the same time, it is also necessary to meet the limits and conditions for all types of RAW in a way that solidified decontamination solution; sorbents etc. would meet after conditioning into FCC activity limits and conditions for their disposal at Mochovce National RAW repository. p. 26 LaC 2.2.2, as well as other attributes of packaged forms, see appendix no. 4 (firmness in pressure and leachability), LaC for liquid RAW, RAW for incineration, RAW for compaction, RAW for bituminisation see chapter 3.2 A02/JZ TSÚ RAO "Limits and conditions for operation of RWTC" (see file on CD: A-02_JZ TSÚ RAO Vyd.3.doc), LaC A-02/RU RAO (national RAW repository) chap. 2.6.2.: "Compression strength of cemented waste and cement filler has to reach after 28 days at the latest the value of minimum 5 N/mm^2 (MPa)".

Basic limits and conditions for the operation of RWTC technological facilities

BITUMINISATION OF RAW:

1 -	pH value of KCV[5] with the content of borates.....	from 10 to 11,5
2 -	pH value of KCV from A1 NPP	from 6,5 to 11,0
3 -	$\sum\beta$ + gamma activity of KCV.....	max. 100 MBq/dm^3
4 -	saltiness of KCV	max. 200g/dm^3
5 -	content of nitrates for KCV	max. 70g/dm^3
6 -	Content of nitrates for KCV from A1 NPP	max. 60g/dm^3
7 -	$\sum\beta$ + gamma activity of sorbents.....	max. 100 MBq/kg
8 -	Content of ion exchange resins in hydromixture	max. 10 hm. %

CEMENTATION OF RAW

A. for the acceptance of liquid RAW – RA concentrates for cementation can be the volume activity β, γ max. 300 GBq/m$^{3.}$

B. for the acceptance of liquid RAW – RA concentrates for cementation can be the volume activity α max. 300 kBq/m^3.

C. for the acceptance of liquid RAW – concentrates for cementation can be the saltiness max. 500 g/dm^3.

[5]KCV = Concentrate from NPP V1

D. for the acceptance of liquid RAW – for not thickened RA liquids for cementation can be the volume activity β, γ max. 200 GBq/m^3.

E. for the acceptance of liquid RAW – for not thickened RA liquids for cementation can be the volume activity α max. 450 MBq/m^3.

F. for the acceptance of solid RAW for cementation can be the volume activity β, γ max. 20 GBq/m^3.

G. for the acceptance of solid RAW for cementation can be the volume activity α max. 450 kBq/m^3.

H. for the acceptance of reinforced RAW for cementation can be the volume activity β, γ max. 200 GBq/m^3,

I. for the acceptance of reinforced RAW for cementation, the value of maximum mass activity α cannot, in any place of package form with RAW, exceed the value of 4000 Bq/g .

COMPACTING OF SOLID RAW

A. Volume $\sum \beta,\gamma$ activity of solid RAW shall be lower than 1 GBq/m^3

B. Solid RAW shall not contain the substances subject to the biodegradation, poison, pyrophoric substances, detonating substances, incendiary substances, complex-forming substances in the amount exceeding 0,1 % hm.

COMBUSTION OF RAW

A. Specific mass $\sum\beta,\gamma$ activity of solid RAW shall not exceed 6 MBq/kg.

Specific mass $\sum\alpha$ activity of solid RAW cannot exceed 100 kBq/kg.

B. Specific volume $\sum\beta,\gamma$ activity of combustible liquid RAW shall not exceed 37 GBq/m^3.

Specific volume $\sum\alpha$ activity of combustible liquid RAW shall not exceed 370 MBq/m^3.

INVENTARY OF RADIOACTIVITY IN THE PACKAGED FORM OF RAW

Radionuclide	**Top layer limits [Bq.m^{-3}]**	**Middle and bottom layers limits [Bq.m^{-3}]**	**Top layer limits [Bq/FCC]**	**Middle and bottom layers limits [Bq/FCC]**
^{14}C	1.35E+10	9.01E+10	4.19E+10	2.79E+11
^{41}Ca	1.70E+10	1.70E+10	5.27E+10	5.27E+10
^{59}Ni	7.35E+11	8.96E+11	2.28E+10	2.78E+12

^{63}Ni	1.14E+13	3.01E+14	3.53E+13	9.33E+14
^{79}Se	3.44E+10	3.44E+10	1.07E+11	1.07E+11
^{90}Sr	1.90E+13	2.75E+14	5.89E+13	8.53E+14
^{93}Mo	1.70E+10	8.06E+10	5.27E+10	2.50E+11
^{93}Zr	2.28E+11	2.28E+11	7.07E+11	7.07E+11
^{94}Nb	4.57E+07	4.97E+07	1.42E+08	1.54E+08
^{99}Tc	4.48E+09	6.69E+11	1.39E+10	2.07E+12
^{107}Pd	1.84E+12	1.79E+13	5.70E+12	5.55E+13
^{126}Sn	2.93E+07	3.19E+07	9.08E+07	9.89E+07
^{129}I	1.91E+07	1.91E+07	5.92E+07	5.92E+07
^{135}Cs	1.43E+10	2.11E+11	4.43E+10	6.54E+11
^{137}Cs	1.01E+13	1.10E+13	3.13E+13	3.41E+13
^{151}Sm	1.14E+14	1.24E+14	3.53E+14	3.84E+14
Total specific activity of alfa emitters: 238Pu, 239Pu, 241Am			Average for FCC max. 400 Bq/g	Average for FCC max. 400Bq/g
Note: Disposability of other alfa radionuclides is not accepted without the documentation to the disposability in NRR by safety analysis and consequent assessment and approval by NRA SR.				

Specification of the RAW packaged forms:

BF I - FCC with radioactive concentrates homogenously solidified in a bitumen matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by non-active cement mixture, filling up minimum of 95% of the internal container volume.

BF II - FCC with radioactive concentrates homogenously solidified in a cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by non-active cement mixture, filling up minimum of 95% of the internal container volume.

BF III - FCC with radioactive concentrates homogenously solidified in a bitumen and cement matrix, in drums. Drums containing bitumen and pellets are grouted by non-active cement mixture, filling up minimum of 95% of the internal container volume.

BF IV - FCC with radioactive concentrates homogenously solidified in a bitumen and cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums

containing bitumen and pellets are grouted by non-active cement mixture, filling up minimum of 95% of the internal container volume.

BF V - FCC with radioactive concentrates homogenously solidified in a bitumen and cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates.

BF VI - FCC with radioactive concentrates homogenously solidified in a bitumen and cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates.

BF VII - FCC with radioactive concentrates homogenously solidified in a bitumen and cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates.

BF VIII- FCC with radioactive concentrates homogenously solidified in a bitumen and cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates.

BF IX- FCC with contaminated water from off gases washing during RAW incineration, solidified in a cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates.

BF X - FCC with contaminated water from off gases washing during RAW incineration, solidified in a cement matrix, in drums. Drums containing bitumen and pellets are grouted by active cement mixture filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates.

BF XI- FCC with contaminated water from off gases washing during RAW incineration, solidified in a cement matrix, in drums and pellets of incombustible solid state from supercompacting. Drums containing bitumen and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement is formed by radioactive concentrates and contaminated water from off gases washing.

BF XII- FCC with contaminated water from off gases washing during RAW incineration, solidified in a cement matrix in drums. Drums containing cement are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates and contaminated water from off gases washing.

BF XIII- FCC with radioactive concentrates, homogenously fixed in a bitumen matrix, in drums and pellets of incombustible state (also with pellets of radioactive ash additived by parafine) from supercompacting. Drums containing bitumen and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement mixture is formed by radioactive concentrates and contaminated water from off gases washing. Physical and mechanical features of the additive ash, after supercompacting, must be at minimum equal with the parameters of the active cement grout:

Compression strength > 5 N/mm2 (MPa)

Leachability index 6"

BF XIV- FCC with liquid sludges, homogenously fixed in an aluminium silicate matrix, in drums and pellets of incombustible state. Drums and pellets are grouted by active cement mixture, filling up minimum of 95% of the internal container volume. The active component of the grout cement is formed by radioactive concentrates. Physical and mechanical features of the additive ash, after supercompacting, must be equal with the parameters of active cement grout:

Compression strength > 5 N/mm2 (MPa)

Leachability index 6"

BF XV – FCC with solid non-compactable objects, compactable objects in a form of supercompacted pellets, radioactive ash pellets additived by parafine and their possible combinations grouted by active cement grout, in which thickened concentrate, not thickened concentrate, sludges, organic aqueous suspension, aqueous suspension of resins, aqueous solutions containing gravel, inorganic grain material, contaminated waters from rinsing, decontamination, waters from off gases washing and their possible combinations are added.

BF XVI – FCC with drums or other enclosed packages with liquid RAW (concentrates, inorganic aqueous suspensions, aqueous suspensions of resins, aqueous mixtures with gravel or other inorganic grain materials) solidified to cement, bitumen or aluminium silicate matrix grouted by active cement grout in which thickened concentrate, not thickened concentrate, sludges, organic aqueous suspensions, aqueous suspensions of resins, water mixtures with gravel, inorganic grain material, contaminated waters from rinsing, decontamination, waters from off gases washing and their possible combinations are added combinations.

BF XVII – FCC with solid non-compactable objects, compactable objects in a form of supercompacted pellets, pellets from radioactive ash additived by parafine and their possible combinations, and drums with liquid RAW (concentrates, inorganic aqueous suspensions, decontamination solutions, rinsing waters, sludge inorganic suspensions, aqueous suspensions of resins, water mixtures with gravel or other inorganic grain material) solidified by cement, bitumen or aluminium silicate, grouted by active cement mixure in which thickened concentrate, not thickened concentrate, sludges, organic aqueous suspensions, aqueous suspensions of resins, water mixtures with gravel, inorganic grain material, contaminated waters from rinsing, decontamination, waters from off gases washing and their possible combinations are added.

BF XVIII – FCC container with radioactive concentrates solidified in a cement matrix. The container is gradually filled with residuals of the active cement matrix originating from cementation facility rinsing, containing thickened concentrate, not thickened concentrate, sludges, organic aqueous suspensions, aqueous suspensions of resins, water mixtures with gravel, inorganic grain material, contaminated waters from rinsing, decontamination, off gases washing and their possible combinations.

BF XIX – FCC with solid non-compactable objects, compactable objects in a form of supercompacted pellets, pellets of radioactive ash additived by parafine and their possible combinations, drums with liquid RAW (concentrates, inorganic aqueous suspensions, decontamination solutions, rinsing waters, sludge inorganic suspensions, aqueous suspensions of resins, water mixtures with gravel or other inorganic grain material) solidified by cement, bitumen or aluminium silicate, grouted by non-active cement mixture to FCC.

RAW package accompanying document

- Name and address of the organisation producing the RAW
- Transportation packaging type and identification number
- RAW marking according to the mode of processing
- RAW characteristics (description and quantity)
- RAW total weight in m3 of the final product
- Filling date of the package
- Dose equivalent rate in contact with the transport packaging (μGy/hour)
- Non-fixed contamination of the transportation packaging (Bq/cm2)
- Data on the radiological composition of the RAW
- Content of free liquids
- Content of biodegradable substances
- Content of pyrophoric and extremely flammable substances

- Content of toxic substances
- Content of explosive substances
- Content of complex-forming substances
- Content of water in transport packaging
- Other important data related to the RAW composition and form
- Submitted by:

  First name:

  Last name:

  Position:

  Telephone:

  Company:
- Accepted by:

  First name:

  Last name:

  Position:

  Telephone:

  Company:
- Declaration

  I declare that the submitted RAW is completely and accurately described in this RAW protocol

A3.2 JAVYS CRITERIA FOR RAW DISPOSAL AT NRR IN MOCHOVCE

These requirements were generally specified by the regulatory body and developed by the operator (in cooperation with the contractor — Nuclear Research Institute — VUJE Trnava) on the basis of generic studies and specific safety assessments, taking into account appropriate radiological criteria, the operating status, the planned duration of active institutional controls and the required specifications of natural and engineered systems.

National Radwaste Repository in Mochovce safe operating limits and conditions are divided into:

- Safety limitations (derived from the safety assessment)
- Operating limitations (related to design, construction and operation, or excluding undesirable phenomena or fulfilling the formal requirements)

The basic radiological criteria for performance/safety assessment were established by the Health Protection authority:

- Effective dose due to the impact of waters discharged from the site of the NRR on an individual from the critical group of population cannot exceed 0.05 mSv per year during the period of institutional control of the repository;
- Effective dose for an individual from the critical group of population as a result of normal evolution scenario cannot exceed 0.1 mSv in any year after the termination of institutional control of the repository;
- Effective dose for an individual from population as a result of intruder activity at the repository cannot exceed 1 mSv in any year after the termination of institutional control of the repository.

The limits were established based on radionuclide inventories and concentrations in individual waste packages.

The duration of institutional control for safety assessment was established by ÚJD SR as 300 years.

Below are some limited specifications for waste package acceptance:

Radionuclide inventory of Mochovce site:

Table 1: Radionuclide inventory of Mochovce site

Radionuclides	Inventory per Repository [Bq]
C-14	2.01E+15
Ca-41	3.78E+14
Ni-59	2.00E+16
Ni-63	N
Se-79	7.68E+14
Sr-90	6.14E+18

Table 1: Radionuclide inventory of Mochovce site

Radionuclides	Inventory per Repository [Bq]
Mo-93	1.80E+15
Zr-93	5.08E+15
Nb-94	N
Tc-99	N
Pd-107	N
Sn-126	N
I-129	4.58E+11
Cs-135	4.72E+15
Cs-137	N
Sm-151	N
Pu-238	N
Pu-239	1.80E+15
Am-241	N

Radionuclide concentration

Table 2: Radionuclide concentration

Radionuclides	Top level [Bqm^{-3}]	Middle and bottom level [Bqm^{-3}]
C-14	1.35E+10	9.01E+10
Ca-41	1.70E+10	1.70E+10
Ni-59	7.35E+11	8.96E+11
Ni-63	1.14E+13	3.01E+14
Se-79	3.44E+10	3.44E+10
Sr-90	1.90E+13	2.75E+14
Mo-93	1.70E+10	8.06E+10
Zr-93	2.28E+11	2.28E+11
Nb-94	4.57E+07	4.97E+07
Tc-99	4.48E+09	6.69E+11
Pd-107	1.84E+12	1.79E+13

Table 2: Radionuclide concentration

Radionuclides	Top level [Bqm^{-3}]	Middle and bottom level [Bqm^{-3}]
Sn-126	2.93E+07	3.19E+07
I-129	1.91E+07	1.91E+07
Cs-135	1.43E+10	2.11E+11
Cs-137	1.01E+13	1.10E+13
Sm-151	1.14E+14	1.24E+14
Pu-238	4.57E+09	4.97E+09
Pu-239	8.24E+07	8.95E+07
Am-241	2.24E+08	2.43E+08

- Waste form: each type of Fiber-Concrete containers (FCC) filling must be approved by the Nuclear Regulatory Authority. Ratio of cement to other waste volume: ≥ 0.62.
- Restriction of undesirable compounds:
  Biodegradable (gas developing) substances
  Pyrophoric substances and substances producing exothermic reaction with water
  Toxic or hazardous wastes
  Free liquids
- Minimum compression strength of cemented waste: 5 MPa
- Leachability of cemented waste: according to USA ANS 16.1 (index >6)
- FCC surface dose rate and contamination: 2 mSv/h; 0.37 Bq/cm2 beta, gamma; 0.037 Bq/cm^2 alpha
- Mass of FCC filled with wastes: maximum weight of individual FCC: 15000 kg; maximum weight of disposed FCCs in dilatation unit (4 vaults – 360 FCCs): 3600 t
- Characteristics of FCC:
  Quality of outer surfaces
  Water-tightness and impermeability
  Labeling
  Minimum compression strength: 71.5 MPa
  Minimum splitting strength: 5 MPa
  Maximum shrinkage: 350 μm/m

APPENDIX 4: REGULATORY FRAMEWORK FOR THE RCS DECONTAMINATION

The following list is not exhaustive and is based on translated designations of the original Slovak Acts, Regulations, Governmental Ordinances and standards designations.

Some documents listed here may have been modified since the moment of publication of this Technical Specification. It is the responsibility of the Contractor to ensure that the correct edition of all relevant legal documents relevant to this assignment is used in the performance of the Contract.

NUCLEAR REGULATIONS

- Act of the Council of the Slovak Republic No. 541/2004 Coll. on peaceful use of nuclear energy (Atomic Act) and on alterations and amendments to some other Acts as amended
- ÚJD SR Decree 430/2011 Coll. on requirements on Nuclear Safety
- ÚJD SR Decree 52/2006 Coll. on professional competency.
- ÚJD SR Decree 53/2006 Coll. which lays down details on requirements for management of nuclear materials, radioactive waste and spent nuclear fuel.
- ÚJD SR Decree 55/2006 Coll. on details in an emergency planning for the event of an incident or an accident.
- ÚJD SR Decree 431/2011 Coll. on Quality Management System.
- ÚJD SR Decree 58/2006 Coll. which lays down details on the scope, content, and method of preparation of nuclear installation documentation necessary for individual decisions.

HEALTH & SAFETY

- Act of the Council of the Slovak Republic No. 124/2006 Coll. on safety and health protection at work, as amended
- Act of the Council of the Slovak Republic No. 355/2007 Coll. on protection, supporting and development of public health and amendments to some other Acts, as amended. June 2007.
- Governmental Ordinance of the Slovak Republic No. 345/2006 Coll. on basic safety requirements for health protection of the workers and general public against the ionizing radiation. May 2006.
- Decree of the Ministry of Labour, Social Affairs and Family of the Slovak Republic No. 508/2009 Coll., establishing details on ensuring safety and health protection in work with technical pressure, lifting, electrical and gas devices and determining technical devices deemed to be restricted technical devices.
- Governmental Order of the Slovak Republic No. 356/2006 of the Coll. on the protection of workers to the risks arising from exposure to carcinogenic and mutagenic factors at work.
- Governmental Order of the Slovak Republic No. 355/2006 of the Coll. on the protection of workers to the risks arising from exposure to chemical factors at work.

- Government Order of the Slovak Republic No. 329/2006 of the Coll. on the minimum health and safety requirements for the protection of workers against the risks arising from electromagnetic fields.
- Decree of the Ministry of Health of the Slovak Republic No. 539/2007 of the Coll. on details on limit values of optical radiation and on requirements on objectification of optical radiation in the environment (UV, infrared and laser);
- Decree of MV SR No.121/2002 Coll. on fire prevention, and on alterations and amendments to some acts, as amended.
- Governmental Order of the Slovak Republic No. 396/2006 Coll. on minimum health and safety requirements on a construction site.

METROLOGY, NORMALIZATION AND INSTRUMENTATION

- Act of Slovak National Council No 142/2000 Coll. in the wording of 431/2004 on metrology and on alterations and amendment to some other Acts as amended
- Government Order of the Slovak Republic No 294/2005 Coll. on measuring instruments (which implements the Directive 2004/22/EC of the European Parliament and of the Council of 31 March 2004 on measuring instruments).
- Decree of the Slovak Office of Standards, Metrology and Testing No. 206/2000 Coll. on units of measurement set out in the wording of Decree No. 537/2009 Coll.
- Decree of the Slovak Office of Standards, Metrology and Testing No. 206/2000 Coll. on units of measurement, as amended.

ENVIRONMENT

- Act No. 24/2006 Coll. on the environmental impact assessment and on alterations of, and amendments to some other Acts, as amended.
- Act No. 223/2001 Coll. on waste and on alterations of, and amendments to some other Acts, as amended.
- Act No. 364/2004 Coll. on water and on alterations of, and amendments to the Act of the NC SR No. 372/1990 Coll. on Minor Offences as amended by later regulations (Water Act).
- Act of the NC SR No. 67/2010 Coll. on conditions applicable to placing on the market of chemical substances and chemical mixtures, amending certain Acts (Chemicals Act).
- Act No. 261/2002 Coll. on the Prevention of Major Industrial Accidents and on amendment and supplementing certain Acts.