Attachment to the letter No. 4/03-06/17945 of 15.11.2017

Answers to the comments on report

«Technical support, consultation and analysis of fuel operation during the third fuel loading at NPP Bushehr, Unit 1», 446-Пр-192

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| № | Comments | Answers |
| 1 | Sheet 5, the last paragraph, the length of fuel cycle for cycles 1 and 2 (according to operational data) and for the 4th fuel cycle (according to ALBUM C4) shall be corrected as follows:   |  |  |  | | --- | --- | --- | | Cycle No. | Length (EFPD) | Length (h) | | 1 | 300.4 | 7209.6 | | 2 | 296.3 | 7111.2 | | 4 | 305.12 | 7322.88 |   Also Length of fuel cycles and other results such as maximum burnup shall be corrected on sheets 5, 6 and 49 (table D.1). | The comment is accepted partially. The length of fuel cycles will be corrected. As to the values of maximum burnup – the only documents, containing the data on maximum burnup, are the Protocols of burnup for each irradiated FA of “BNPP-1” NPP (Protocol “Calculation of Burn up for each irradiated FA of BNPP-1”). Please confirm the relevancy of using the data on maximum burnup of UTVS taken from the above-mentioned Protocols, or to present the operational documents containing such information. |
| 2 | Sheet 7, paragraph 2.3.3, it is mentioned that” there is no information available on the first month of operation of Unit 1 of “Bushehr” NPP” while the monthly power operation data have been sent for TVEL during the third fuel cycle also the binary data of ICIS for the whole third fuel cycle have been submitted after the end of cycle. | The comment is not accepted. In the operational data, transferred monthly to JSC “TVEL” by the Iranian party (Series), there are not data available on operation of Unit 1 of “Bushehr” NPP for the period from the beginning of the third loading to March 5, 2016, inclusive. Please send to our address operational data on this period, and following that document 446-Пр-192 will be corrected with regard for these data. |
| 3 | Sheet 16, the first Para, Some words given in Russian. It shall be translated to English. | The comment is accepted. The first para on sheet 16 will be given in the following wording: Analysis of operational data for the period of the third fuel loading showed that the maximum value of coolant temperature at outlet of UTVS was 330,28 °С, and it does not exceed scheduled values given in Table 2.1. |
| 4 | Sheet 35, paragraph 4, it is mentioned that the code CORE\_1 is not certified, so it is requested to send us an official document or letter from Gidropress in which explained that the procedure for obtaining certificate from the Russian regulatory authority organization is progressing. Also it is needed to submit some documents in which explained about physical models used in the code with more details. | The code CORE\_1 is developed on the basis of the certified code FAME\_N1, and its calculation procedures repeat at most the corresponding procedures certified in Rostekhnadzor. Results of calculations of thermo-mechanical behavior of FA for Unit 1 of “Bushehr” NPP, given in document 446-Пр-192, were obtained with regard for only the main factors governing FA bowing during operation. For compensation of the effect of the non-considered factors, the values of the factors considered in the calculation were assigned higher than the average values (maximum values instead of the most probable values).  Nowadays the code CORE\_1 is under updating as to the consideration of additional factors influencing FA bowing during operation. On completion of the updating OKB “GIDROPRESS” is going to certify the code CORE\_1 in Rostekhnadzor.  OKB “GIDROPRESS” is going to carry out the additional thermo-mechanical calculations for Unit 1 of “Bushehr” NPP, wherein just all the important factors, governing FA bowing during operation, will be considered within the framework of the contract obligations, and also the report on verification of FA models, used in thermo-mechanical calculations |
| 5 | Sheet 38, paragraph 4.2, it is mentioned that “on completion of the third fuel loading no LCC by the bottle method was performed”, while this operation was performed in accordance with the attached document under ACT NO. “RPT-1220-9606”. | The comment is accepted. In document 446-Пр-192 it will be indicated that on completion of the third fuel loading the LCC by bottle method was performed for 49 spent FAs (according to document RPT-1-1220-9606). |
| 6 | Sheet 38, paragraph 4.2 , it is mentioned that “time of CPS CR drop at the beginning and end of fuel loadings is within the design limits, except for six CPS CRs of group 10 with the drop time recorded below the specified values at the beginning and end of loading. As the most probable cause of the given phenomenon is malfunction of the CPS CR drop time measurement system, it is recommended to perform the check of the given system to reveal the cause of malfunction”, but it should be noted that at the time of dropping test, the group 10 was not at the ULS and was closer to the core bottom, so the dropping time is below the design limits in accordance with the attached dropping time ACTs and Protocols (see DROPPING\_TIME\_DOCS.RAR). | The comment is accepted. In document 446-Пр-192 it will be indicated that drop of six CPS CRs of group 10 was made not from the ULS, but from the height of 700 mm (35th pitch of the drive) at the beginning of the third fuel loading, and from the height of 2016 mm (108th pitch of the drive) at the end of the third fuel loading |
| 7 | Sheet 47, the cartogram of third fuel cycle is wrong. For example the type of assembly 15-24 is 36 and assembly 05-28 is 24.this cartogram shall be corrected. | The comment is accepted. Cartogram of the third fuel loading will be corrected. |
| 8 | Sheet 49, table D.1, the mentioned date for beginning of the third fuel cycle is 09.02.2016 while according to the Protocol No. 1600-PL033 the true date for beginning of the third fuel cycle is 02.02.2016, because the date for beginning of fuel cycle is considered at the time of CPS-AR dropping test at hot zero power state. | The comment is accepted. The date of the beginning of the third fuel loading will be corrected. |