**FEDERAL STATE UNITARY ENTERPRISE VO “SAFETY”**

Reg. No. 08/619 **"APPROVED"**

of 02.11.2016

Deputy Director for Development-

Head of STS Direction of

FSUE VO “Safety”

M. Kuznetsov

" " 2016

**EXPERT REPORT**

**on results of review of Chapter 7 “Instrumentation and control systems (I&C)” of**

**Final Safety Analysis Report. “Bushehr” NPP. Power Unit 1.   
49.BU.1 0.0.ОО.FSAR.RDR001**

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**Moscow 2016**

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# 1. Introduction

## 1.1 Subject of review

Chapter 7 "Instrumentation and control systems (I&C)" of document “Final Safety Analysis Report. Power Unit No. 1. “Bushehr” NPP” 49.BU.1 0.0.ОО.FSAR.RDR001 (revision 2, issued in December 2014).

## 1.2 Basis for review

NNSD Work Order for review of Chapters 3-11, 15, 16 of Final Safety Analysis Report on Power Unit No. 1 of “Bushehr” NPP 49.BU.10.0.OO.FSAR.RDR001 (revision 2 dated March 2015) (hereinafter referred to as the FSAR) corrected on the results of commissioning of BNPP-1 (INRA/NNSD letter No. 2016/07 of 29.02.2016).

## 1.3 Objective and tasks of review

The objective of preliminary review is assessment of sufficiency of safety substantiation for NPP "Bushehr" Power Unit-1 in the stage of operation.

In review of Chapter 7 "Instrumentation and control systems (I&C)" of the FSAR, the following tasks were determined:

* assessment of modifications introduced to Chapter 7 "Instrumentation and control systems (I&C)" of the Final Safety Analysis Report, "Bushehr" NPP, Power Unit No.1, on results of the Power Unit commissioning and in connection with the technical decisions taken in the stage of the Power Unit commissioning;
* assessment of correctness of modifications introduced to Chapter 7 "Instrumentation and control systems (I&C)" of the Final Safety Analysis Report, "Bushehr" NPP, Power Unit No.1, considering the comments made during the review of the FSAR, revision 0.1.4.

## 1.4 Expert judgments on the issue

Chapter 7 "Instrumentation and control systems (I&C)" of document "Final Safety Analysis Report. Power Unit No.1. NPP "Bushehr" 49.BU.1 0.0.ОО.FSAR.RDR001” (revision 2 issued in December, 2014) represents a description of Automated Process Control System (APCS) that is intended for control and monitoring of the main and auxiliary technological processes of heat and power generation at NPP and for safety assessment under all operating conditions including emergency situations and accidents, as well as NPP efficiency during normal operation.

Total list of all the design modes with operational occurrences and the design-basis accidents requiring automatic action of the I&C systems is given in Sections 15.1 and 15.2 of Chapter 15.

For every accident initiating event, provisions are made for relevant technical and organizational measures to prevent and mitigate consequences of effects on the protective barriers through restricting the normal operation as much as to shut down the NPP.

The safety functions are fulfilled by a number of the APCS parts to provide “defence-in-depth” at different levels in accordance with severity of the caused malfunctions:

1. First level - prevention of the operational occurrences to ensure safe operation of the Power Unit and to minimize probability of accident initiating events. For this, the normal operation I&C are used for control and monitoring for:

* keeping the main technological process;
* maintaining and restricting effect on the barriers within the operational limits;
* monitoring the critical safety functions, safety parameters and preparedness of safety systems;
* ensuring the living environment for personnel;
* restricting radiation effect upon the personnel, public, environment.

2. Second level - mitigation of the operational occurrence consequences. For this, the normal operation APCS systems are applied including safety-related systems used for control and monitoring for:

* keeping (restriction, termination) the main technological process;
* maintaining and restricting effects on the barriers within the safe operation limits and conditions;
* monitoring the critical safety functions, safety parameters and preparedness of safety systems;
* ensuring the living environment for personnel;
* restricting radiation effect upon the personnel, public, environment.

3. Third level - during design-basis accidents, the safety systems are activated. For this, the control safety systems are used for reactor shutdown and bringing the NPP to a safe condition. NPP safety is provided due to:

* reliable termination of the main technological process;
* maintaining and restriction of effects on the barriers within maximum design limits;
* monitoring of RP sub-criticality, safety parameters and operation of safety systems;
* providing the living environment for personnel;
* restricting radiation effect upon the personnel, public, environment.

4. Fourth level - restriction of the beyond design-basis accident consequences. For this, any accessible I&C systems are used, as well as additional systems intended to maintain the living environment for the shift personnel and to protect the containment system against effects arising, inter alia, from possible failure of the rest barriers as well.

In this situation, the I&C systems and organizational measures shall ensure:

* termination of the main technological process;
* maintaining and restriction of effects on the barriers for potential reduction of the maximum design limit on the containment system;
* ensuring the living environment for personnel;
* restriction of radiation effects upon the personnel, public, environment.

To fulfil all the tasks assigned for the APCS, it consists of the following:

* sensors;
* pulse tube laying downstream the shut-off devices or the root valves;
* racks and elements to install the sensors;
* remote control tools for interlocks and protections;
* software & hardware for information processing, storage and transmission;
* information display and recording tools (secondary instruments, displays, panels, indicators, etc.);
* local boards and central control boards with on-line command elements;
* means for input and output of the information and control discrete signals for the actuating switchgear devices;
* cables, cable lines and penetrations;
* tools of power supply to APCS hardware complex from the auxiliary switchgear busbars including low-voltage devices;
* automation tools to be delivered together with the process equipment;
* radiation monitoring tools;
* instrumentation, racks, equipment and tools to ensure maintenance, repair and metrological support of the APCS tools.

The structure of the automated process control system (APCS) has a hierarchical principle of integration as per the Power Unit break down into process functional areas and groups where hardware of low-level automatics provide implementation of tasks of communication with a process control object (data collection and generation of commands), as well as implementation of tasks pertaining to protections, interlocks, self-regulation, alarm and control of the valves, mechanisms, solenoids, etc.

The APCS engineered tools of the Power Unit include the RP monitoring, control and protection systems, which fulfill specific functions for reactor protection, reactor power restriction and regulation through effect on actuators, diagnostics functions of equipment and reactor core condition, coolant leaks detection, they perform functioning analysis and ensure self-diagnostics of auxiliary engineered tools and communication lines.

**Expert judgment on algorithms of protections and interlocks of safety systems**

**Assessment of algorithms for compliance with the safety requirements**

Assessment of algorithms for compliance with the safety requirements is based on the principle that an algorithm, as a design product, is a control tool to be implemented in the software-and-hardware complex.

Reliability of CSS safety functions fulfillment fully depends on both design properties of the algorithm and the engineered tools implementing it.

In review, since CSS has a four-train structure, YZ algorithm is considered as consisting of four separate algorithms, i.e.: algorithm YZ 20 - 1 YZ 20, 2 YZ 20, 3 YZ 20, 4 YZ 20.

**Compliance of software-and-hardware tools implementing the control algorithms with the requirements of regulatory documents**

The description of control system ofsafety systems activation (Section 7.3 of FSAR) contains the developer’s information that the CSS and its engineered tools are in full compliance with the requirements of OPB-88/97 and recommendations specified in the regulatory documents, at that:

- S&HW are capable of fulfilling safety functions in case of a single failure, failure on an initiating event cause and during maintenance. Requirement of item 1.2.12 of OPB-88/97 is fulfilled.

* Classification of the system and S&HW, accordingly, is in compliance with the provisions specified in Section 2 of OPB-88/97.
* S&HW are capable of fulfilling functions under internal and external impacts. Requirement specified in item 4.1.5 of OPB-88/97 is fulfilled.
* Measures for prevention and protection of S&HW against a common cause failure (functional and physical independence, manual control during PIE, control from two control boards) are taken. Requirement specified in item 1.4.6 of OPB-88/97 is fulfilled.
* Continuous automatic and periodic diagnostics of S&HW functioning in accordance with the algorithm are envisaged. Requirement specified in item 4.4.5.8 of OPB-88/97 is fulfilled.

At the same time, it is mentioned that the description of SS activation system does not contain the information that continuous automatic and periodic diagnostics of manual control signal operability (from buttons at MCR and ECR, via RCD up to the input to the algorithm) are envisaged. This concerns algorithms YZ 10, YZ 20 and YZ 30, wherein the manual control is envisaged.

There is neither no information about continuous automatic and periodic diagnostics of input signal "Gamma-background" in algorithm YZ 60 and, generally, about a possibility to control the detector of this signal during normal operation.

* YZ CSS automatically performs the function of SS activation; and with it, CSS SS also automatically performs control functions for the process safety system. Requirement specified in item 4.4.5.2 of OPB-88/97 is fulfilled.
* A possibility of remote control over SS (on algorithms of a specific system) is also envisaged in the design. Failure in the circuit of automatic switch-on (on YZ) does not impede the remote activation. Requirement specified in item 4.4.5.4 of OPB-88/97 is fulfilled.

**Compliance of YZ (YZ 10-60) algorithms properties with the requirements and recommendations of documents on NPP safety**

The regulatory documents used during the review do not contain the requirements directly referring to the algorithms – the requirements do not specify that this particular requirement is related to the algorithm, but not to the whole control system. The fact that the requirement or recommendation is related to the control algorithm can be derived only from their meaning content.

Assessment of algorithm properties for compliance with the requirements of OPB-88/97 concerning algorithms:

* Requirements specified in item 1.2.12 – safety.

All groups of algorithms are implemented in four trains and are capable of performing the control function during a single failure, an initiating event failure and a maintenance failure. As for impact to FSIV, YZ 20 does not fail in case of a single failure and an initiating event failure.

The algorithms are in compliance with the requirement specified in OPB-88/97.

* Requirements specified in item 4.4.5.2 – automatic fulfillment of a function.

All groups of YZ algorithms perform functions automatically on PIE signals, and three groups of YZ on operator’s command as well. The algorithms are in compliance with the requirement of OPB-88/97. Manual activation by the operator with YZ priority is not governed in OPB-88/97.

* Requirements specified in item 4.4.5.3 – blocking of operator’s actions.

YZ algorithms block the operator’s actions till full completion of the safety function, as it is required in item 4.1.11 of OPB-88/97. This design decision does not contradict the requirement for blocking within 10-30 min.

The design is in compliance with the requirement of OPB-88/97.

* Requirements of item 4.1.8 – availability of tools preventing personnel single errors.

Tools to prevent personnel single errors "pushing the buttons at MCR or ECR" for actuation of algorithms of YZ10, YZ20 and YZ30 groups are not envisaged in the design.

These groups of algorithms are not in compliance with the requirement of OPB-88/97.

* There is no requirement for blocking of actions of equipment protections on YZ commands in OPB-88/97.

Failure of the equipment protection during SS activation on YZ command should be considered as "a single failure" corresponding to the requirement of item 1.2.12 in OPB-88/97. If we consider the protection failure in the design as additional and as required according to item 1.2.12, in this case we would have a greater reliability redundancy than it is required by the standards.

**Compliance of ТН algorithms properties with the requirements and recommendations related to NPP safety**

The main difference of the design decisions related to the control algorithms for ТН system is that the algorithms for control over pumps ТН10÷40D001 and gate valves (four in each train, 16 altogether) on the water supply pipelines to RP, envisage the interruption of YZ command and performance of actions by the operator (disabling the pump or closing the gate valves), which is not in compliance with the safety requirements.

The command interruption process is followed by alarm "Warning" and "Non-conformity".

This design decision is not in compliance with the following requirements of OPB-88/97, if the operator used the button and disabled all ТН trains:

* The started protective action is not brought to the full completion. Requirement specified in item 4.1.11 is not fulfilled.
* Measures to prevent personnel single errors during the interruption of YZ commands are not taken – the operator can disable the only one activated pump ТН10 or ТН15, or cut off water supply to the reactor from the only one activated pump. Requirement specified in item 4.1.8 is not implemented.
* The operator can remove the blocking by his actions on TH system in less than 10-30 min. Requirement specified in item 4.4.5.3 is not implemented.
* In general, the operator’s right to interrupt the command for safety systems actuation could lead the operator by mistake or intentionally to stop performance of the safety function – removal of decay heat from the reactor core, and to transfer the design-basis accident into the beyond-design-basis accident.

This means that the requirement specified in item 1.2.12 about assuring safety during "a single error of personnel independent on an initiating event" is not implemented and the safety assurance concept is violated, item 4.1.2.

* OPB-88/97 does not prohibit the interruption of YZ command, but it prohibits stopping the protective action by the operator.

The protective action is interrupted only if the operator erroneously puts out of work all the activated trains or the last operating train of the SS, only in this case the design decision proposed for the control system of "Bushehr-1" NPP would not comply with the requirements of items 4.1.11, 1.2.12 and 4.1.2 of OPB-88/97.

If the operator does not make a mistake, then there is only one deviation from the requirements of OPB-88/97 on item 4.4.5.3 – the ban can be canceled earlier than it should last (10-30 min.).

**Analysis of permissibility on safety conditions of design decision for interruption of control safety system commands by the operator**

1. BNPP-1 Power Unit is designed in such a way that the operator’s intervention in protective actions till full deactivation of the protection function is unnecessary. However, in order to prevent the operator’s erroneous actions after actuation on YZ, in accordance with the requirement specified in item 4.1.8 of OPB-88/97 ("the design shall provide for tools to mitigate the personnel single errors"), the ban of operator’s actions is envisaged.

At the same time, to manage the consequences of false activation, i.e. when there is no PIE and normal operation is underway, the algorithms of individual elements of systems assuring the safety function - emergency heat removal, envisage interruption of the false protection command and, respectively, interruption of its action.

This action, as performed on a false command, is not protective.

2. Interruption of YZ protection commands by the operator and, as a result, termination of protective actions till their full completion are implemented in the design in such a way that the operator can erroneously deactivate the last or the only one safety system train activated on PIE. Apparently, in order to prevent an error, the operator’s actions are regulated in "special instructions for remote control over mechanisms in emergency modes" (i.7.3.1.2 FSAR).

But the operator can make "a single error" and deactivate the only operating train of the SS.

The design, with regard to interruption management, shall exclude a possibility of disabling the last operating train, which is a condition for safety assurance during the design initiating event of an accident.

3. The draft of algorithms, with regard to interruption of YZ commands for individual SS elements, shall be supplemented with measures to minimize false impact on the button for commands cancelation. For this purpose, besides "special instructions" and alarm "Warning" and "Non-conformance", it is necessary to arrange for alarm "Manual control is permitted" and "Manual control is prohibited".

Sufficiency of the measure proposed should be confirmed by the probabilistic analysis of safety function fulfillment.

# List of adopted abbreviations

AFPS - automatic fire protection system

APCS - automated process control system

ARPC - automatic reactor power controller

ATPC - automatic turbine power controller

AWS - automated workstation

CAS - complex analysis system

CPSE - control and protection system equipment

CSE - control system electronics

CSS - control safety system

CV - control valve

DDLH - data display and logging hardware

DG - diesel generator

ECC - emergency command cabinet

ECCS - emergency core cooling system

ECR/SCR - emergency control room/standby control room

EMC - electromagnetic compatibility

EP - emergency protection

ERM - emergency radiation monitoring

ESFAS - engineered safety feature actuation system

ESFIP - engineered safety feature initiating part

ISPE - industrial seismic protection equipment

FCC - facility communication complex

FSAR - Final Safety Analysis Report

FSIV - fast-acting steam isolation valve

GDC - general design criteria

GMP - generalized mimic panel

HP - high pressure

ICIS - in-core instrumentation system

ICSE - initial cause signaling equipment

I&C - instrumentation and control system

IOPRS - important operation parameters registration system

LAN - local area network

LCB - local control board

LCC - local crisis center

LP - low pressure

LSS - limit stop switch

MCDS - monitoring, control and diagnostics

MCR/UCB - main control room/unit control board

NFME - neutron flux monitoring equipment

NNSD - National Nuclear Safety Department

NPP - nuclear power plant

PICS - programmable instrumentation and control system

PIE - postulated initiating event

PLC - power limitation controller

PP - preventive protection

PPPE - process parameter protection equipment

PSA - Probabilistic Safety Analysis

PSAR - Preliminary Safety Analysis Report

PSLE - power setback and limitation equipment

RB - regulatory body

RC - reactor compartment

RCD - remote control device

RCP - reactor coolant pump

RMI - reactivity monitoring instrumentation

RMS - radiation monitoring system

RO - reactor operator

RP - reactor plant

SG - steam generator

SGIC - system of group and individual control

S&HWC - software-and-hardware complex

S&HWC ICND - soft-and-hardware complex of in-core acoustic diagnostics

S&HWC-P - software-and-hardware complex of protections

SLPE - signal logical processing equipment

SS - safety system

SW - software

TLS-U - top level system of the power unit

TO - turbine operator

USS - unit shift supervisor

WS - workstation

# 2. Comments to Chapter 7 of FSAR

## 2.1 General comments to the Chapter

2.1.1 Substantiation presented in Chapter 7 of the FSAR should confirm that the control systems are capable of maintaining the system variables within the limits of design operating parameters in transients and during normal operation occurrences such as power variation of reactor, turbine, occurrences in feedwater systems and steam bypasses.

The Chapter is missing the following to carry out the full analysis:

* information on turbine and generator protections;
* information about main regulation systems and Power Unit regulators: turbine regulation system, system of coolant level regulation in the pressurizer, pressure regulator in the primary circuit, level regulator in the steam generator, regulator BRU-А, regulator BRU-К (regulation laws, synchronization modes, redundancy, bringing to automatic mode and switchover to the remote control mode, failures, etc.);
* information about reduction of turbo-generator and RP power balances when disabling the turbine hall equipment and unsuccessful ASBE. **(2.1-1)**

2.1.2 Main regulation systems shall control the reactor and turbine power in such a way that the primary and secondary circuits be able to operate in power and material balance at the selected power level, which shall be confirmed by the analysis (non-conformance with i. 4.4.4 of OPB-88/97). **(2.1-2)**

2.1.3 Information about control loops stability is missing (non-conformance with i. 4.4.4 of OPB-88/97). **(2.1-3)**

2.1.4 Information confirming implementation of the "defense-in-depth" principle for the secondary circuit equipment is missing. **(2.1-4)**

2.1.5 Since Section 7.7 of FSAR describes instrumentation and control systems not related to safety systems, all the descriptions related to S&HWC-P shall be shifted to the respective Section of the FSAR (Section 7.2). **(2.1-5)**

2.1.6 Chapter 7 of FSAR requires serious updating to confirm observance of safe operation limits and conditions (a fuller analysis for substantiation of the design compliance with the design general criteria and safety criteria), a thorough analysis of potential operator’s intervention before the expiry of the time ban after safety systems actuation, full observance of requirements of regulatory documentation and other supporting documents (including manufacturers’ documentation), as well as with account of the comments given in the present report. **(2.1-6)**

2.1.7 Additional materials and modifications described in Appendix 1 to the PSAR have not been included to Chapter 7 of the FSAR, which resulted in degradation of some sections of the FSAR as compared to the PSAR. **(2.1-7)**

2.1.8 The modifications introduced into APCS design after issuance of the FSAR, as well as the results of acceptance tests of APCS subsystems of the Power Unit and software-and-hardware complexes have not been reflected in Chapter 7 of the FSAR. **(2.1-8)**

2.1.9 The information and, correspondingly, analysis of radiation monitoring and "black box" subsystems (important operation parameters registration system) are missing from Chapter 7 of the FSAR. **(2.1-9)**

**General comments related to algorithms**

2.1.10 The description of "Systems of actuation …" does not contain full information about acceptability of manual operations: there is no data on sufficiency and clarity of the presented information, about necessity for manual operations, sufficiency of time for performance of necessary actions. The operator is provided with the manual and tools for implementation only (buttons at MCR and ECR). **(2.1-10)**

2.1.11 False actuation of safety systems.

Main principles:

* false actuations minimization;
* false actuation shall not affect safety;
* more than one false actuation shall not be at any time.

The control system shall be designed as resistant to false actuations of this system and shall not activate safety systems or devices when it is not necessary and process parameters do not comply with PIE. The following requirement to the design of algorithms results from this recommendation: the activation conditions shall be assigned in such a way that they could occur only in case of an accident and could not occur in any other condition of the Power Unit or its operating mode during normal operation and operational occurrences.

Conditions of SS activation in YZ10 group and containment isolation in YZ30 group on Δts<10°C signal do not comply with the recommendation, since Δts<10°C could occur at the shutdown and cooled down reactor during violation of heat removal mode (the coolant in the reactor can be heated up to 90°С), during erroneous pressure drop in the RP after performance of hydraulic testing for leak-tightness and during pressure regulator failure in the pressurizer.

In these cases, all trains of ТН system (HP and LP) are activated, the gate valves on the pipelines from ECCS hydraulic accumulators to the reactor open, and the containment is isolated, the operator is discharged from control until he comprehends to use YZ signal interruption button (there is no such button in the hydraulic accumulator system).

False actuation of high pressure pumps (ТН15÷45D001) and opening of valves on water supply pipelines to the reactor from ECCS hydraulic accumulators affect safety, because pressure could occur in the RP, which exceeds permissible one with regard to conditions for reactor vessel metal cold brittleness.

Summary:

* number of false actuations is not minimized in the design – the algorithms in two groups actuate for all the trains;
* false actuation on YZ10 group affects safety;
* more than two failures are possible at the same time (YZ10 and YZ30). **(2.1-11)**

**Additional comments to the algorithms**

2.1.12 It is mentioned in the ESFAS description that manual control of SS activation is designed for three protections, including the containment localization. But the algorithms of this group – YZ30 have no input signal "operator’s command", only PIE signals are present. **(2.1-12)**

2.1.13 The protective action on group of YZ60 algorithms for control over TW system is automatic, but in the description (table 7.3.1.3-2) – manual by the operator. **(2.1-13)**

2.1.14 There is no condition for algorithm actuation on Δts signal in algorithms of group YZ10 (primary circuit leak). Hence, false actuation is possible, since Δts<10°C could occur during normal operation occurrences, at that, all the trains of ТН system are activated and the containment is isolated on YZ30 algorithms. **(2.1-14)**

2.1.15 As for groups of algorithms YZ10, YZ20 and YZ30, wherein manual operation is envisaged, there is no information that measures are taken to prevent erroneous putting SS to operation, if the operator erroneously pushes the start buttons. **(2.1-15)**

2.1.16 Algorithms YZ10 "Primary circuit leak" and YZ30 "Containment isolation" are different in output signals only, and actuation signals in both algorithms are the same. The necessity for two algorithms for protection under the same PIE is not clear. It would be logic to unite these protections and isolate the containment on В1 commands from YZ10 algorithms. **(2.1-16)**

2.1.17 The source of input signal р>30kPa in groups of YZ10 and YZ30 algorithms is designated as YCS05ER105, i.e. designated with the reactor symbols YC, but not with the containment symbols XQ, wherein these pressure sensors are located. **(2.1-17)**

2.1.18 "Technology" for interruption of YZ command by the operator is not in compliance with the requirement of item 4.1.8 of OPB-88/97 – no tools to prevent the operator’s single error. **(2.1-18)**

2.1.19 Comments on RA system:

* There is no possibility for transition of BRU-A to "Cooldown" mode after temperature rise in the primary circuit <200°С/h in algorithms of control SG PSD 11RAS10BA001, 12RAS20BA001, 13RAS30BA001, 14RAS40BA001 when protection signal "Primary–to-secondary leak" is present, which contradicts document 49.BU1 0.0.00.FSAR.RDR001. **(2.1-19)**
* According to FSAR 49.BU1 0.0.00.FSAR.RDR001, item 15.2.3.5.2.3, table 15.2.3.5-2, the cooldown of SG (primary circuit) through BRU-A is envisaged with the rate of 15°С/h in mode "Primary–to-secondary leak within steam generator" under temperature in the primary circuit lower than 200 °С. In respect of functionality of BRU-A regulator, the cooldown rate of 30°С/h is envisaged in this case. **(2.1-20)**
* In algorithms 11RAS10EE001, 12RAS20EE001, 13RAS30EE001, 14RAS40EE001, during actuation of set point РSG<6.27 МPа and the following remote opening of CV RAS10÷40AS003 by the operator, their "suspension" in half-open condition (escape from LSS) takes place, because the blocking for CV closing is given to input Р (protective closing) of mask CV irrespectively of the command given for the valve opening. The command for opening will be at the mask input until CV opens >6%, and the command for closing will be until the limit stop switch is actuated. Since both commands are given to protective inputs of CV mask and the logic of their priority processing (in case of blocking Р<6.27 МPа) is missing from the algorithm, the above described situation takes place. **(2.1-21)**
* The algorithms of BRU-A control 11RAS10EE001, 12RAS20EE001, 13RAS30EE001, 14RAS40EE001 envisage the ban of remote control over BRU-A regulators from ECR and MCR in disabled mode "Cooldown" and pressure in SG being lower than 6.27 МPа. This would not allow to provide the "natural circulation" mode of the primary coolant in case of deactivation of all RCPs. In order to eliminate this fault, it is necessary to envisage a possibility for BRU-A remote control in "Cooldown" mode and envisage an interlock that would prevent a possibility of exceeding the cooldown rate by the operator in the remote mode more than 60°С. **(2.1-22)**
* In algorithms 11RAS10AS005, 12RAS20AS005, 13RAS30AS005, 14RAS40AS005, when cooling down via BRU-A in case of actuation of protection "Primary–to-secondary leak" to gate valve RAS10-40AS005, two equivalent commands stand for opening and closing and, as a result, the gate valve would remain in open position. **(2.1-23)**
* Algorithms 12YZS60EY001A, 12YZS60EY002A, 12YZS60EY003A, 12YZS60EY004A for formation of protection "Primary–to-secondary leak" for BRU-А 1-4 in the third and fourth safety systems are different from the process algorithms for setting and implementation of these algorithms in functional plans of the first and second safety systems. **(2.1-24)**

2.1.20 The value of nominal level in SG (2450 mm or 2400 mm) should be clarified for RS system. **(2.1-25)**

2.1.21 As for TH system, the selection of cooldown mode at the rate of "30°С/h" and "60°С/h" is envisaged in the functional layouts of primary circuit scheduled cooldown regulators in algorithms 11THS10DT001, 12THS20DT001, 14THS40DT001 in automatic mode. As it comes from the pre-commissioning experience on the similar system of commercial Power Unit V-230, the cooling down at the temperature of the primary circuit being lower than 200°С shall be performed at the rate not more than 30°С/h (as per requirement of OKB Gidropress, the cooldown mode at the rate of 60°С/h was excluded). **(2.1-26)**

2.1.22 While using the developed algorithms, it is impossible to use pump unit TH18(28,38,48)D001 for removal of cooling pond decay heat in all Power Unit operating modes as it is envisaged in FSAR 49.BU.1 0.0.ОО.FSAR.RDR001 (Ch. 6.3.1.1.5.5 "Functioning of the system" of the FSAR):

* it is impossible to supply chilled water from the cooling pond through heat exchanger ТН10(20,30,40)В003, because control valve ТН10(20,30,40)S007 cannot be opened in the remote mode. The ban on disabled condition of TH10(20,30,40)D001 is applied to it;
* it is not possible to open ТН10(20,30,40)S011 in order to return water to the cooling pond at the required flow rate. The ban on disabled of TH10(20,30,40)D001 is applied to it. **(2.1-27)**

2.1.23 The design does not envisage interlocks that would prevent the joint operation of pump units TH18(28,38,48)D001 and TH10(20,30,40)D001. (The joint operation of pump units TH18(28,38,48)D001 and TH10(20,30,40)D001 leads to operation of TH18(28,38,48)D001 in "non-flow" mode). **(2.1-28)**

2.1.24 The position of control valve TH10(20,30,40)S008 in "standby" mode is not clearly defined. Depending on operator’s actions, the situation is possible when the valve turns out to be closed. Besides, the closed position of valve is accepted for initial condition of the subsystem according to the FSAR (Chapter 6, Table 6.3.1.1.3.6-1). The command for the valve opening is envisaged only on actuation of YZ10 protection. **(2.1-29)**

2.1.25 While preparing TH10(20,40) train for operation in scheduled cool down mode of the primary circuit (connection to the primary circuit and heat up of the train prior to the coolant injection to the circuit), the situation is possible when the pump flow rate can be reduced to lower than 240 m3/h because of the operator’s error. Flow rate reduction of the operating pump with open TH90S001, TH90S002, TH90S005, TH90S006, TH10,20,40S006, TH91(92,94)S001 will lead to opening of TH10(20,40)S013,014 and ingress of the primary coolant to tank   
TH10(20,40)B001,002. **(2.1-30)**

2.1.26 De-energization and activation of the step-wise startup during the cool down of the primary circuit also initiates the situation when the ingress of "hot" coolant from the primary circuit to TH10(20,40)B001,002 occurs. **(2.1-31)**

2.1.27 Implementation of YZ60 protection ("Primary–to-secondary leak") is distinctly different from the design algorithm and as a result it is impossible to cool down the RP through BRU-A during management of the emergency situation. **(2.1-32)**

## 2.2 Assessment of modifications introduced to Chapter 7 on results of Power Unit commissioning and in connection with the accepted technical decisions

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| **ISSUE SHEET 1** | | | |
| **1. ISSUE IDENTIFICATION** | | Issue number | 2.2-1 |
| Section number | 7.4 |
| Page | 7-154 |
| Facility | "Bushehr-1" NPP | | |
| Issue title | Management of mode "pressure rise restriction in the primary and secondary circuits" | | |
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| **2. ISSUE CLARIFICATION** | | | |
| 2.1 Technical decision description | | | |
| Use of BRU-K is added for mode "pressure rise restriction in the primary and secondary circuits" | | | |
| 2.2 Assessment of modifications introduced | | | |
| It is considered in Revision 2 of the FSAR and introduced to Table 7.4-3 "List of systems required to bring the Unit to a safe condition during operational occurrences" | | | |
| 2.3 Recommendations | | | |
| To consider in the final SAR | | | |
| 2.4 References | | | |
| Register of changes of FSAR Chapter 7 Section 7-4 Revision 2 | | | |

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| **ISSUE SHEET 2** | | | |
| **1. ISSUE IDENTIFICATION** | | Issue number | 2.2-2 |
| Section number | 7.3.1.3 |
| Page | absent |
| Facility | "Bushehr-1" NPP | | |
| Issue title | Compliance of MCR and ECR boards, WD package 34.BU.1 0.0.AP. PZ. RDR005 | | |
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| **2. ISSUE CLARIFICATION** | | | |
| 2.1 Technical decision description | | | |
| Compliance of MCR and ECR boards, WD package 34.BU.1 0.0.AP. PZ. RDR005 | | | |
| 2.2 Assessment of modifications introduced | | | |
| Not introduced. | | | |
| 2.3 Recommendations | | | |
| Give Table 7.3.1.3-1 in subsection 7.3.1.3 and introduce the modification | | | |
| 2.4 References | | | |
| Register of changes of FSAR Chapter 7 Section 7-4 Revision 2 | | | |

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| **ISSUE SHEET 3** | | | |
| **1. ISSUE IDENTIFICATION** | | Issue number | 2.2-3 |
| Section number | 7 |
| Page | no |
| Facility | "Bushehr-1" NPP | | |
| Issue title | Dismantling of control rod boards of reactor plant control and protection system in building ZE, elevation 0.00, room Е0336 | | |
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| **2. ISSUE CLARIFICATION** | | | |
| 2.1 Technical decision description | | | |
| 1. Dismantle the equipment specified in Appendix to the Technical Decision (Appendix 1).  2. The equipment subject to dismantling shall be handed over to warehouse storage. | | | |
| 2.2 Assessment of modifications introduced | | | |
| List of equipment subject to dismantling is specified in Appendix 2 to "TECHNICAL DECISION No. CS.1.TAG.BAS.ZE.1L.0222" | | | |
| 2.3 Recommendations | | | |
| Perform the above-mentioned actions | | | |
| 2.4 References | | | |
| TECHNICAL DECISION No. CS.1.TAG.BAS.ZE.1L.0222 | | | |

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| **ISSUE SHEET 4** | | | |
| **1. ISSUE IDENTIFICATION** | | Issue number | 2.2-4 |
| Section number | 7 |
| Page | no |
| Facility | "Bushehr-1" NPP | | |
| Issue title | Use of digital circuits for transmission of control and alarm commands to APCS ESFAS S&HWC of "Bushehr-1" NPP | | |
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| **2. ISSUE CLARIFICATION** | | | |
| 2.1 Technical decision description | | | |
| The transmission of control commands for safety systems through potential signals via wire communications between the functional modules was envisaged in the design of APCS ESFAS S&HWC of "Bushehr-1" NPP.  Decided:  Use digital data transmission circuits (input-output busbar and fast exchange busbar) in ESFAS S&HWC (circuits 1 - 4) for transmission of control and alarm commands. Use wire communications for data transmission to adjacent complexes only. | | | |
| 2.2 Assessment of modifications introduced | | | |
| The analysis carried out by VNIIA has shown that transmission of commands within ESFAS S&HWC via input-output busbar (within instrumentation rack) and fast exchange busbar (between instrumentation racks) has a number of advantages as compared to the option envisaged in the design, in particular:   * use of basic diagnostics function is more efficient than the diagnostics of wire communications envisaged in the design; * possibility of false activation of actuating mechanisms during a single failure is excluded; * time necessary for transmission of commands via digital circuits does not exceed the time of transmission via wire communication taking into account the delays necessary for operation of the control algorithm; * reliability properties of S&HWC are practically identical for both options of commands transmission; * operating documentation on ESFAS S&HWC is simplified; * a uniform approach to I&C-RC S&HWC and ESFAS S&HWC is implemented; * procedures for introduction of modifications to ESFAS S&HWC at NPP Site are considerably simplified. | | | |
| 2.3 Recommendations | | | |
| 1. FSUE "Atomenergoproekt" should reflect the present technical decision when issuing the BNPP-1 final safety analysis report.  2. FSUE VNIIA should ensure manufacture of the ESFAS S&HWC equipment (circuits 1 - 4) for BNPP APCS with account of the present technical decision. | | | |

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| 2.4 References |
| APCS, equipment of ESFAS S&HWC (circuits 1 - 4). Technical decision No. CS.ТАG.АSE.00.00.0653 |

# 2.3 Remaining issues after assessment of correctness of modifications due to comments made during review of the FSAR, revision 0

**NNSD comments on Appendix C (to MoM to FSAR-7 (Rev. 0) dated 03-13.03.07, Tehran)**

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 16 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.16)** |
| **Recommendation:** Item 7.1.1.6.2  - control of the power unit is not only control within man-machine interface framework, for example, control from safety panels;  - the power unit is not controlled from the LCC, only WS being a subscriber of Power Unit LAN is located in the LCC. | |
| **Reply** 16 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.16)** |
| **Reply:** Comment is accepted.  From item 7.1.1.6.2 the following will be deleted: " - Local Crisis Centre (LCC)". | |
| DECISION No 16 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.16)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted and the following text will be introduced in the FSAR Rev. 1:  **“LCC is provided for NPP monitoring.”** | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 18 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.18)** |
| **Recommendation:** Item 7.1.1.6.2  Description of the ECR is incorrect and does not contain necessary information:  - the ECR has a different design from that of MCR safety panels;  - there are significant differences in CPS panels of the MCR and ECR;  - the ECR provides for external WS, but not an automated workstation;  - it is necessary to indicate which software is to be installed on the ECR WS to ensure access to all operational systems | |
| **Reply** 18 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.18)** |
| **Reply:** Comment is accepted.  The design of the ECR panels is similar to the MCR panels.  The last para of item 7.1.1.6.2 will be added by the following: "… Reactor and Turbine buildings". | |
| DECISION No 18 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.18)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** See reply 169. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 22 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.23)** |
| **Recommendation:** Page 26, item 12  - inconsistency with GOST R 50746-2000. Design group TS for safety class 2 for noise resistance shall be IV, function quality criteria – A.  - delete Table 7.1.1.3 as it contains a requirement for noise resistance for noise of one type only. There shall be a reference to the a.m. GOST | |
| **Reply** 22 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.23)** |
| **Reply:** Comment is accepted.  In the text the following will be indicated: "TPTS passed the tests on noise resistance as per category IV, function quality criteria – A."  The mentioned Table in page 25 will be deleted | |
| DECISION No 22 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.23)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 39 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.40)** |
| **Recommendation:** Item 7.1.2.17 (SC17)  The text of the first sentence is technically incorrect using such notions as “reactor startup”, “fuel insertion into the core”. Probably they should be “reactor startup”, “CR insertion into reactor core” (comment on the Russian version only) | |
| **Reply** 39 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.40)** |
| **Reply:** Comment is accepted  The text in brackets will be given as follow: "(reactor trip, containment isolation, boron injection into reactor core, etc.)". | |
| DECISION No 39 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.40)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 47 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.48)** |
| **Recommendation:** There are no integral reliability parameters:  - average parameter of EP actuation flow due to APCS failures;  - probability of safety functions non-fulfilment due to CSS failures to be determined at the interval of 1 year and maintenance (testing) for 720 hours for protective and isolating functions.  At that, references to respective calculations confirming fulfilment of these parameters should be given.  Confirmation of calculation data is assured by collection of Power Unit operation parameters starting from the second year of operation. | |
| **Reply** 47 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.48)** |
| **Reply:** The reply to the given comment is presented in Reply 2.11 of PSAR Supplement No.1.  Item 7.2.1.6 FSAR shall be supplemented with the following text:  "On the basis of calculations given in PSA (18.BU.1 0.0.00.VAB.PR) probability of failure of EP electric part to actuate by demand is 6,7х10-8.  On the basis of calculations given in PSA (18.BU.1 0.0.00.VAB.PR) the maximum value of probability of failure within one safety channel is less than, than 1х10-4 per one demand".  The calculations were performed on the basis of statistical data on reliability of accessories, obtained by the results of tests and operation experience | |
| DECISION No 47 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.48)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 48 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.49)** |
| **Recommendation:** There are no numerical parameters for:  - time for EP signal generation (from signal generation by a sensor till de-energization of CR drive mechanisms);  - time for actuation CSS if a respective requirement occurs;  - time for passage of process operator’s commends from WS to actuator;  - time for passage of signals from sensors till display at process operator’s WS.  (inconsistency with OPB-88/97, items 4.4.4, 4.4.5, 4.4.6) | |
| **Reply** 48 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.49)** |
| **Reply:** Comment is not accepted.  We consider that clarification of this data at present is prematurely. At commissioning the special tests on time for passage of signals are planned, following which they will be introduced in FSAR | |
| DECISION No 48 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.49)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Data from TA will be added to the text in FSAR Rev 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 52 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.53)** |
| **Recommendation:** Page 7-24  The expression "lowering of all CPS CR to the end-pieces of the core bottom" is not correct | |
| **Reply** 52 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.53)** |
| **Reply:** Comment is not accepted.  Comment is not clear. It requires additional explanation | |
| DECISION No 52 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.53)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The wording will be changed as follows: “bottom limit switches” and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 55 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.56)** |
| **Recommendation:** Item 12  The code of GOST R 50746-2000 is incorrect | |
| **Reply** 55 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.56)** |
| **Reply** Comment is accepted  The text will be corrected by "GOST R 50746-2000" | |
| DECISION No 55 | FSAR SECTION: 7  **FSAR Section 7.1.** **(4.4.1.56)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted. The require correction will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 61 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.4)** |
| **Recommendation:** Item 7.2.1.5 (basic principles)  It is necessary not just to declare independence of instrumentation channels, but to word independence principles according to which the channels can be considered independent.  For example, such principles can be as follows:  - individual pulse lines;  - individual sensors;  - separation of signals by different cables;  - separate routes for cables laying;  - special grounding;  - power supply;  - physical separation of equipment;  - absence of links between channels;  - possibility of one channel bringing out for testing;  - galvanic separation inside EP set with the equipment not participating in generation of emergency protection signal. | |
| **Reply** 61 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.4)** |
| **Reply:** Item 7.2.1.5 will be given in the following wording:  “The basic principle of monitoring the process parameters, used in the emergency protection system, is a principle of independence of the protection system instrumentation channels.  Independence of the instrumentation channels inside a set is assured by:   * individual sensors for each channel; * individual cable communication lines; * special grounding; * separate power feeders;   - separation of signals by different cables;   * power supply; * absence of links between instrumentation channels; * possibility of one channel bringing out for testing;   - galvanic separation inside EP set with the equipment not participating in generation of emergency protection signal” | |
| DECISION No 61 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.4)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 62 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.5)** |
| **Recommendation:** The scheme of temperature measurement (fig. 7.2-2) carries little information. A detailed scheme should be given as follows: "TTT – CDC TTT – penetration – converting device – processing device – comparison with set point – coincidence – alarm – control," and it should be shown that the requirements to error values are satisfied under all operating conditions | |
| **Reply** 62 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.5)** |
| **Reply:** The scheme given in Figure 7.2-2 (as well as in Figures 7.2-3, 7.2-4, 7.2-5) is the enlarged scheme. The scheme of signal processing in ECPS is given in Figure 7.2-14. No presentation of more detailed information in Section 7.2 FSAR is required according to RG 1.70 | |
| DECISION No 62 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.5)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Additional materials will be provided during the commissioning license stage | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered. The data of pre-commissioning activities are not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 63 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.6)** |
| **Recommendation:** Fig. 7.2-3, 7.2-4  Same as the previous comment | |
| **Reply** 63 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.6)** |
| **Reply:** The scheme given in Figure 7.2-2 (as well as in Figures 7.2-3, 7.2-4, 7.2-5) is the enlarged scheme. The scheme of signal processing in ECPS is given in Figure 7.2-14. No presentation of more detailed information in Section 7.2 FSAR is required according to RG 1.70 | |
| DECISION No 63 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.6)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Additional materials will be provided during the commissioning license stage | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered. The data of pre-commissioning activities are not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 67 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.10)** |
| **Recommendation:** Bring in conformity Tables 7.2-5, 7.2-6, 7.2-7, 7.2-8 between each other as for the following parameters:  - neutron flux change period;  - minimal critical heat flux ratio;  - linear energy release | |
| **Reply** 67 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.10)** |
| **Reply:** The mentioned missing parameters will be included into Tables 7.2-5, 7.2-6, 7.2-7 and 7.2-8 | |
| DECISION No 67 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.10)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 68 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.11)** |
| **Recommendation:** It is not clear why Table 7.2-6 lacks in-core monitoring sensors on parameters of neutron flux change period and minimal critical heat flux ratio | |
| **Reply** 68 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.11)** |
| **Reply:** The neutron flux change period is determined by calculation in NFME as per the data obtained from the neutron sensors arranged in IC channels of the rector concrete cavity.  The second part of the comment is accepted. Table 7.2-6 will be supplemented with the data on NTMC in-core instrumentation sensors | |
| DECISION No 68 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.11)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 70 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.13)** |
| **Recommendation:** Table 7.2-8  There should be a commentary made to the table to explain the impact of inertial property on the error of protection actuation on monitored parameters | |
| **Reply** 70 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.13)** |
| **Reply:** The following commentary will be made to Table 7.2-8:  “Sluggishness of the instrumentation channel is considered in performing the safety analysis” | |
| DECISION No 70 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.13)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 71 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.14)** |
| **Recommendation:** Fig. 7.2-12  - connection of neutronic and process parameter sensors to NFME, SHC-3, EPPS and signal logic processing equipment is incorrectly shown;  - outputs of adjacent channels of one EP set are not shown from SHC-3 to signal logic processing equipment | |
| **Reply** 71 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.14)** |
| **Reply:** Figure 7.2-12 will be corrected | |
| DECISION No 71 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.14)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 72 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.15)** |
| **Recommendation:** Page 7-67, last paragraph but one  The MCR has no operating display of NFME, therefore it is not clear how change of settings is controlled | |
| **Reply** 72 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.15)** |
| **Reply:** The NFME information is represented on the displays of TLS-U. The text will be corrected according to the comment | |
| DECISION No 72 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.15)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 73 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.16)** |
| **Recommendation:** The schemes in fig. 7.2-12, 7.2-13, 7.2-14 do not reflect the concrete approaches to transmittal of EP signals from the equipment of the initiating part to the actuating one. Therefore it is necessary to provide a diagram (functional and/or schematic) of signal generation and transmittal from the signal logic processing equipment (separately for EP, preventive protections and accelerated preventive protections) by channel and by set (indicating their location) and their path through all cabinets of the actuating part of EP (preventive protections and accelerated preventive protections), including that for power supply | |
| **Reply** 73 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.16)** |
| **Reply:** A set of Figures 7.2-12, 7.2-13 and 7.2-14 presents a sufficient scope of the information for understanding of interaction of the reactor shutdown system main components. Presentation of the more detailed information in 7.2 FSAR is not required according to RG 1.70 | |
| DECISION No 73 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.16)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Fig. 7.2-12 (English version) will be corrected and included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 74 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.17)** |
| **Recommendation:** Page 7-77  When describing schemes of trip signals generation it is necessary to indicate action of signals of EP, accelerated preventive protection, PP-1, PP-2 (tripped/not tripped) after signal of initial cause is cancelled | |
| **Reply** 74 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.17)** |
| **Reply:** The following sentence will be added into item 7.2.13: “Action of the reactor emergency protection in response to the trip command is brought to an end irrespective of presence of the signal of initial cause.  Description of action of APP, PP-1, PP-2 under removal of the signal of initial cause is presented in ii 7.7.1.2.1 FSAR | |
| DECISION No 74 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.17)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 75 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.18)** |
| **Recommendation:** Page 7-69, last paragraph  Contents of the paragraph shall be specified (where the signal is generated, which is to be transmitted to the turbine control system, and how it is being transmitted) | |
| **Reply** 75 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.18)** |
| **Reply:** Content of the paragraph will be supplemented with the information on the fact that the signal for turbine trip is transmitted from ECC (emergency command cabinets) through the galvanically decoupled communication lines | |
| DECISION No 75 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.18)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 77b | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.22)** |
| **Recommendation:** Page 7-82.  For case of failure of one of SHC-3 sets it is necessary to indicate the value of increased error for determination of design parameters and in the in core instrumentation system computational center and evaluate from the view point of trustworthiness of protection signals to be generated on in-core local parameters | |
| **Reply** 77b | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.22)** |
| **Reply:** With failure of one set of SHC-3 the ICIS provides a generation of reactor core protection signals by in-core local parameters with the help of the second set of SHC-3 and in this case a high mistake from the viewpoint of protection signals validity doesn’t occur. The error of calculated parameters in CC UL will not exceed the permissible design value | |
| DECISION No 77b | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.22)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply will be completed and introduced in the FSAR Revision 1: Since during failure of one SHC-P set, the remaining SHC-P set is working with old adjustment coefficients, the error of local parameters calculation in it will not change.  Additional information on the changes of the local parameters calculation error in case of one SHC-P failure will be provided in response to additional request from FTO Safety | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 78 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.23)** |
| **Recommendation:** Page 7-84  Indicate the time for actuation of EP actuating part for the following 2 cases:  - on receipt of EP signals from signal logic processing equipment;  - on initiation of EP signal from MCR, ECR | |
| **Reply** 78 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.23)** |
| **Reply:** The time for actuation will be given.  0,3s – from EP initiating part;  0,2s – from EP buttons in MCR, ECR | |
| DECISION No 78 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.23)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 79 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.24)** |
| **Recommendation:** Item 7.2.1.7 (reference)  The design of WWER-640 has not been implemented up to now; therefore the reference to it is incorrect.  Substantiation of reference of NFME, EPPS, signal logic processing equipment is cursory, since the word “prototype” does not say anything about actual difference or similarity of earlier used tools with the equipment to be used for the Bushehr NPP power unit | |
| **Reply** 79 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.24)** |
| **Reply:** The reference to the design of WWER-640 will be deleted and replaced with the following wording: “…similar NFME, PPPE, SLPE operated at Unit 3 of Kalinin NPP” | |
| DECISION No 79 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.24)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 80 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.25)** |
| **Recommendation:** Item 7.2.1.8 (arrangement of reactor trip system equipment)  According to Table 7.2-10 the cabinets of EP actuating part ShPU, ShP6M, ShP6M1 (safety class 2U) of both sets of the reactor trip system are arranged in the rooms with normal operation equipment (inconsistency with PBYa RU AS-89, item 2.3.2.14) | |
| **Reply** 80 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.25)** |
| **Reply:** The sets of the EP actuating part are located in different parts of RCIS room and at a sufficient distance from one another. They cannot suffer the common cause failure, i.e. the requirement of i. 2.3.2.14 PBYa RU AS-89 is met | |
| DECISION No 80 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.25)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1.   1. Normal operation equipment arranged in this room is designed for MDE by its mechanical strength. 2. The rooms are separated with fire-proof doors | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 81 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.26)** |
| **Recommendation:** Item 7.2.1.9 (check of the system):  - indicate which tools display malfunctions of primary transducers and communication lines;  - phrase “continuous in-service observation for the state of units and devices…” is of no technical sense;  - if testing and check means the same, then it is necessary to use a single term.  If these processes are different, then it is necessary to describe their differences.  This item should be supplemented with a system check diagram; this would allow clear understanding completeness of the system check as a whole using individual stages and areas of overlapping of individual checks | |
| **Reply** 81 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.26)** |
| **Reply:** 1. In case the difference in sensor readings is more than 2Δосн (where Δосн is the base measuring error) the indications appear on panels 30LBT11 and 30LBT12 in MCR.  2. The term “continuous in-service observation” should be understood as the equipment examination once a shift.  3. The term “testing” will be deleted.  4. The presented description of checks is sufficient for the given FSAR Section. Presentation of more detailed information is not required according to RG 1.70 | |
| DECISION No 81 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.26)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The text of the FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 82 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.27)** |
| **Recommendation:** Page 7-88 (power supply)  The power supply schemes to which the reference is given in this item are missing from Section 7.1 | |
| **Reply** 82 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.27)** |
| **Reply:** The last sentence in the description of electric power supply will be given in the following wording: “Detailed power supply schemes for the reactor trip system are presented in Chapter 8 FSAR and Appendix C Book 3 of Chapter 7 FSAR” | |
| DECISION No 82 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.27)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The text of the FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 83 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.28)** |
| **Recommendation:** Page 7-88 (climatic conditions)  Specify the values of all indicators (see supplement to PSAR).  Indicate which types of the system tools are used inside the containment | |
| **Reply** 83 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.28)** |
| **Reply:** The comment is accepted. The necessary changes will be made | |
| DECISION No 83 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.28)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the comment. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 84 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.29)** |
| **Recommendation:** Page 7-100  After the paragraph "Requirements for seismic stability," specify that all tolls have passed qualification tests (including seismic stability, electromagnetic compatibility, climatic testing, etc.) and are able to perform the required functions under all designed modes and under all external factors at all stages of the lifecycle | |
| **Reply** 84 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.29))** |
| **Reply:** The comment is accepted. The necessary changes will be made | |
| DECISION No 84 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.29)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the comment | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 85 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.30)** |
| **Recommendation:** Page 7-100 (reliability indices, actuation time)  The actuation time is missing from the mentioned item. | |
| **Reply** 85 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.30)** |
| **Reply:** The comment is accepted. The actuation time (0,3 s) will be given | |
| DECISION No 85 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.30)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 86 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.31)** |
| **Recommendation:** Item 7.2.2.2  This wording does not mean that the reactor shutdown system provides the diversity criteria (see the IAEA comments) | |
| **Reply** 86 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.31)** |
| **Reply:** The diversity in the reactor emergency shutdown system hardware is not provided in the design and not required according to the NTD of RF and Iran.  According to PBYa RU AS-89 two systems of the reactor shutdown are realized constructed by different actuation principles (see i. 2.3.1.4 of PBYa RU AS-89) | |
| DECISION No 86 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.31)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** In the FSAR Rev. 1, the text will be completed with information from item 7.2.1.6 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 88 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.33)** |
| **Recommendation:** Item 7.2.2.4  This item declared review of two safety criteria SC3 and SC4, however only safety criterion SC3 was reviewed.  There is no SC4 (equipment qualification assessment).  (Inconsistency with NUREG-0800) | |
| **Reply** 88 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.33)** |
| **Reply:** The text will be supplemented with the following:  “Equipment was subjected to qualification tests for mechanical, seismic, climatic impacts and electromagnetic compatibility, and meets the requirements stated for the equipment of class 2” | |
| DECISION No 88 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.33)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 90 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.35)** |
| **Recommendation:** Item 7.2.2.8  It is necessary to introduce supplement in this item  “Exceptions are critical heat flux ratio and linear energy release, which are calculated by indices of in-core instrumentation sensors” | |
| **Reply** 90 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.35)** |
| **Reply:** The indicated text will be included into FSAR | |
| DECISION No 90 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.35)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the comment | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 91 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.36)** |
| **Recommendation:** Item 7.2.2.11  At the FSAR stage there should already be exact instructions, which information an operator receives on condition of bypasses and in which form, or it is necessary to give respective clarifications, if there is no need for this.  OKP21 has nothing to do with this item | |
| **Reply** 91 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.36)** |
| **Reply** The text of i.7.2.2.11 will be supplemented with the following sentence: “Information on condition of bypasses (values of process parameters) is represented on the displays of TLS-U and indicating instruments on the MCR panel” | |
| DECISION No 91 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.36)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 92 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.37)** |
| **Recommendation:** Item 7.2.2.12  SC18 (access to setting set-points) is not considered, though it was declared. OKP21 has nothing to do with this item | |
| **Reply** 92 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.37)** |
| **Reply:** The first part of the comment – the second sentence will be given as follows:  “Administrative, managerial and technical measures provide for authorization of the access to setting set-points”.  The second part of the comment – the comment is accepted, OKP 21 will be deleted from the given item | |
| DECISION No 92 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.37)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 95 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.40)** |
| **Recommendation:** Item 7.2.2.16  It is necessary to specifically indicate which display tools are used for information representation, but not about actuation of the set breakers | |
| **Reply** 95 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.40)** |
| **Reply:** The following will be included into the text: “… on information panels of MCR and ECR…” | |
| DECISION No 95 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.40)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 96 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.41)** |
| **Recommendation:** Item 7.2.2.17  The reference to the previous item is incorrect | |
| **Reply** 96 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.41)** |
| **Reply:** The last sentence will be given as follows” “In the preceding item the data are given on the presentation of information on the initial cause of actuation” | |
| DECISION No 96 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.41)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 101 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.46)** |
| **Recommendation:** In Table 7.2-2, the omission in line “Corresponding section of FSAR chapters” is not clear for initiating events “Decrease of network frequency below 46 Hz”, “seismic effect” | |
| **Reply** 101 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.46)** |
| **Reply:** The comment is accepted. During revision in Table 7.2-2 instead of omissions the reference will be indicated to Chapter 15 FSAR and Chapter 3 FSAR, respectively | |
| DECISION No 101 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.46)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 102 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.47)** |
| **Recommendation:** In Table 7.2-2, for criterion “Excessive pressure in containment more than 0.029 MPa” the initiating event is not indicated | |
| **Reply** 102 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.47)** |
| **Reply:** The comment is accepted. For the criterion “Excessive pressure in containment more than 0.029 MPa” the initiating events will be indicated: “SB LOCA (break of pipeline Dnom less than 100), LB LOCA (break of pipeline Dnom more than 100), spectrum of steamline break inside and outside the containment” | |
| DECISION No 102 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.47)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 103 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.48)** |
| **Recommendation:** Page.7-59, the 2nd paragraph from below  It is not clear which system cable rooms are in question where conversion devices are arranged | |
| **Reply** 103 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.48)** |
| **Reply:** The comment is accepted. The conversion devices are arranged in the inter-envelope space in building ZB | |
| DECISION No 103 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.48)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 104 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.49)** |
| **Recommendation:** Clarify Table 7.2-4  The purpose of the table continued is unclear (page 7-54) except two last lines | |
| **Reply** 104 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.49)** |
| **Reply:** In the Table continuation the list is presented for the thermal converters related to SHC-3, included into the set of MCDS. In the Table continuation the MCDS will replaced with SHC-3 | |
| DECISION No 104 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.49)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 105 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.50)** |
| **Recommendation:** Page 7-74, last bullet  Information being recorded in protection set rooms shall be transmitted to TLS-U for storage in common-plant archive, but not for representation to the operators, since it is not operative anymore | |
| **Reply** 105 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.50)** |
| **Reply:** The information recorded in the system rooms is:   * transmitted to TLS-U for representation and archiving; * archived in the rooms of sets | |
| DECISION No 105 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.50)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 107 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.52)** |
| **Recommendation:** Table 7.2-9  The table does not present algorithms, but actually lists of signals and logics of emergency protection generation | |
| **Reply** 107 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.52)** |
| **Reply:** The given presentation of the algorithms in the form of formalized logic structure gives a visual presentation of the emergency protection actuation logic and was agreed earlier in РSAR | |
| DECISION No 107 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.52)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The following text will be added in the reply: “ Algorithms are provided in Appendix D to Chapter 7 of the FSAR Rev. 1” | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 109 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.54)** |
| **Recommendation:** Page 7-87, In-Core Instrumentation System SHC-3  The second paragraph deals with reference and shall be placed in the respective Section | |
| **Reply** 109 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.54)** |
| **Reply:** The second paragraph will be transferred into i. 7.2.1.7 | |
| DECISION No 109 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.54)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 109a | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.55)** |
| **Recommendation:** When describing the SHC-3 of the in-core instrumentation system the signals being generated for transmission of the signal logic processing equipment are called relay signals (page 7-87), binary signals (page 7-88), discrete signals (7-90).  The same name for same signals shall be used | |
| **Reply** 109a | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.55)** |
| **Reply:** The comment is accepted. The text will be revised | |
| DECISION No 109a | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.55)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the comment | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 111 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.57)** |
| **Recommendation:** Item 7.2.1.9 (check of the system)  The text on APCS maintenance shall be deleted, since the reactor trip system is in question here | |
| **Reply** 111 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.57)** |
| **Reply:** The term APCS in item 7.2.1.9 will be replaced with the word “systems” | |
| DECISION No 111 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.57)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The Russian text of FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 112 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.58)** |
| **Recommendation:** Page 7-97 (initiating events of accidents)  There is no list of algorithms in Table 7.2-2 to which the reference is given | |
| **Reply** 112 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.58)** |
| **Reply:** The last sentence in the paragraph will be as follows:  "The list of accident initiating events and the corresponding actuation conditions is presented in Table 7.2-2" | |
| DECISION No 112 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.58)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 113 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.1)** |
| **Recommendation:** Item 7.3.1.2.1:  - group the listed systems in 3 groups – separately protective, isolating and auxiliary systems;  - clarify the relation of the fuel storage and transport system (the last bullet) to the systems started from the MCR | |
| **Reply** 113 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.1)** |
| **Reply:** The comment is accepted partially.  - Classification of the systems, given in item 7.3.2.1, is presented in FSAR Chapters 3, 6, 8, 9 and it is not expedient to repeat it in Chapter 7.  - System GY will be deleted from the list | |
| DECISION No 113 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.1)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 125 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.15)** |
| **Recommendation:** Table 7.2-8  There should be a commentary made to the table to explain the impact of inertial property on the error of protection actuation on monitored parameters | |
| **Reply** 125 | FSAR SECTION: 7  **FSAR** |
| **Reply:** The following commentary will be made to Table 7.2-8:  “Sluggishness of the instrumentation channel is considered in performing the safety analysis” | |
| DECISION No 125 | FSAR SECTION: 7  **FSAR Section 7.2 (4.4.2.13)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 126 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.16)** |
| **Recommendation:** Table 7.3.1.3.7-1  - why this Section contains data on MCDS;  - which I&C is in question;  - what is the relation of humidity parameters, values of PH, electric conductivity, oxygen concentration to the Section under review.  The Table shall contain data on accuracy norms of the whole channel for control and information display, including value of additional error | |
| **Reply** 126 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.16)** |
| **Reply:** Comment is accepted.  From Table 7.3.1.3.7-1 the data on CMS, MCDS, oxygen concentration, electric conductivity, values of PH, humidity will be deleted | |
| DECISION No 126 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.16)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply will be completed as per reply 148 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 127 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.17)** |
| **Recommendation:** Item 7.3.1.3.8  The first sentence mentions the time for ICSS only (without PSCS) not for the system on the whole.  This item should specify complete time of system initiation in accordance with implemented technical decisions (without possible options). | |
| **Reply** 127 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.17)** |
| **Reply:** Comment is not accepted.  We consider that clarification of this data at present is prematurely. At commissioning, the special tests on time for passage of signals are planned, following which they will be introduced in FSAR | |
| DECISION No 127 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.17)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the data from TA | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 128 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.18)** |
| **Recommendation:** Item 7.3.1.3.9  No analysis of general design criteria GDC.  The text only states that the design shall meet them (inconsistency with NUREG-0800) | |
| **Reply** 128 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.18)** |
| **Reply:** Comment is accepted.  Item 7.3.1.3.9 will be deleted.  In the names of the following items will be added   |  |  | | --- | --- | | 7.3.2.1 | GDC 20 | | 7.3.2.2 | GDC 23 | | 7.3.2.5 | GDC 22 | | 7.3.2.6 | GDC 22 | | 7.3.2.7 | GDC 24 | | 7.3.2.8 | GDC 13 | | 7.3.2.9 | GDC 13 | | 7.3.2.10 | GDC 21 | | |
| DECISION No 128 | FSAR SECTION: 7  **FSAR Section 7.3 (4.4.3.18)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 207 | FSAR SECTION: 7  **FSAR Section 7.6 (4.4.6.7)** |
| **Recommendation:** Criterion SC20  Specify what recommendations for the fire fighting personnel are meant.  FSUE VO “Safety” which the special task “Automated fire protection system supervisor” should be agreed with knows nothing about its implementation in the TLS-U | |
| **Reply** 207 | FSAR SECTION: 7  **FSAR Section 7.6 (4.4.6.7)** |
| **Reply:** Comment is accepted.  From item 7.6.2.2.6 the following wording will be deleted: "Recommendations can be issued on the operator’s enquiry to the personnel that provide firefighting" | |
| DECISION No 207 | FSAR SECTION: 7  **FSAR Section 7.6 (4.4.6.7)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 212 | FSAR SECTION: 7  **FSAR Section 7.6 (4.4.6.12)** |
| **Recommendation:** Page 185  Marking of fire fighting controller JBW is wrong | |
| **Reply** 212 | FSAR SECTION: 7  **FSAR Section 7.6 (4.4.6.12)** |
| **Reply:** Comment is accepted.  Marking "JBW" will be replaced by "JBВ" | |
| DECISION No 212 | FSAR SECTION: 7  **FSAR Section 7.6 (4.4.6.12)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 213 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.1)** |
| **Recommendation:** Page 217, 1st paragraph:  - specify how the CRs are lifted from the lower mechanical stops (to the lower limit switch);  - at what malfunctions of the group and individual control system it is possible to use the mentioned mode and for what purposes (Power Unit is shutdown, what is the purpose of lifting CRs at failed group and individual control system) | |
| **Reply** 213 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.1)** |
| **Reply:** The procedure of CRs lifting from the lower mechanical stops is performed in the following way:  - under the mode of manual group/individual control the operator in MCR, using the button “Removal from the stop”, makes lifting of the selected group/selected CRs of one group from the lower stop to the lower limit switch. The more detailed description of the procedure is given in the operation regulations.  The above-mentioned mode is used for reducing the mechanical wear of the CPS drives | |
| DECISION No 213 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.1)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 214 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.2)** |
| **Recommendation:** Page 218, paragraph after the table  The wording of this paragraph lacks any technical sense | |
| **Reply** 214 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.2)** |
| **Reply:** In the given paragraph the wording “ensures the single error” will be replaced with the wording “prevents operator’s error” | |
| DECISION No 214 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.2)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 215 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.3)** |
| **Recommendation:** Item 7.7.1.1.10  Since during loss of normal operation power supply the set continues operation from the storage battery, it is necessary to indicate time of the set operation in this mode | |
| **Reply** 215 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.3)** |
| **Reply:** The comment is accepted.  The scheme of the backup power supply makes it possible to provide the power supply to the CRs position control equipment under accident conditions during 1 h under complete loss of a.c. power supply (see Chapter 8) | |
| DECISION No 215 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.3)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 216 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.4)** |
| **Recommendation:** Item 7.7.1.2.4  A scheme of channel-by-channel check of signals PP-1, PP-2, APP shall be given (inconsistency with OPB-88/97, item 4.1.10) | |
| **Reply** 216 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.4)** |
| **Reply:** The comment is accepted. PP checks are performed simultaneously with checks of the reactor shutdown systems. The order of checks of PP initiating part is similar to that given in i. 7.2.1.9 “System checks”. The text of section 7.7.1.2.4 FSAR will be corrected | |
| DECISION No 216 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.4)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 217 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.5)** |
| **Recommendation:** Item 7.7.1.3  This item shall contain the ARM algorithm and information on verification of its software | |
| **Reply** 217 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.5)** |
| **Reply:** The text of i. 7.7.1.3 and Figure 7.7-5 contain the information on APC algorithms. Verification and validation have been made for the APC software. The scope of the presented information corresponds to RG 1.70. No FSAR revision is needed | |
| DECISION No 217 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.5)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The following sentence will be added in the text of FSAR Rev. 1: **“**Verification and validation have been made for the APC software” | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 218 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.6)** |
| **Recommendation:** Item 7.7.1.3.6  Presentation of information on ARM is described in general words. Where the information goes to and what sort of information goes to the operator shall be described | |
| **Reply** 218 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.6)** |
| **Reply:** The text of i. 7.7.1.3.6 will be supplemented with the following information:  “For APC control the following is arranged on the MCR panel 30LBT01 for the operator:   * switch of mode selection and putting the APC into operation and the corresponding indicators; * indicators of APC serviceability; * buttons of APC mode selection with the corresponding indicators; * key for APC on/off for individual channel, for control of the selected group of CPA CRs by APC commands; * buttons for correction of setpoints by MSH pressure | |
| DECISION No 218 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.6)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 218a | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.7)** |
| **Recommendation:** Page 242, 1st paragraph  What specialized equipment is meant, where is it described? | |
| **Reply** 218a | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.7)** |
| **Reply:** The specialized equipment represents a complex of level and temperature indication equipment and it consists of four independent channels | |
| DECISION No 218a | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.7)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The description of level monitoring will be included in FSAR Rev. 1 section 7.5 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 218b | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.8)** |
| **Recommendation:** Item 7.7.1.4.3.7  This item shall reflect the issue of procedure of changing the ICIS adjustment parameters | |
| **Reply** 218b | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.8)** |
| **Reply:** Adjustment parameter variation is not provided for SHC-IC | |
| DECISION No 218b | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.8)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The description of level monitoring will be included in FSAR Rev. 1 section 7.5 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 218c | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.9)** |
| **Recommendation:** Item 7.7.1.4.3.9  It is necessary to substantiate arrangement of the in-core noise diagnostics SHC together with SHC-3 | |
| **Reply** 218c | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.9)** |
| **Reply:** ICNDE-SHC is purposed for SPND signals variable component processing and analysis with the purpose of coolant local boiling detection within the core scope.  The necessity of ICNDE-SHC arrangement in close vicinity to SHC-P in rooms ZK1 and ZK2 is caused by the reason that the signals of SPND signal variable components have the level 10-10 – 10-11 A and should be transferred from SHC-P to ICNDE-SHC without signal intermediate processing and amplification (otherwise all necessary noise data can be lost).  ICNDE-SHC is tested and referred to seismic category 1 as per PNAE G 006-97 to prevent ICNDE-SHC influence to SHC-P, IV group of hardware design version as per GOST P 50746 of electromagnetic compatibility (communications between ICNDE-SHC and SHC-P have no galvanic coupling, the protocol of data transfer from SHC-P to ICNDE-SHC is unidirectional, ICNDE-SHC hardware are supplied from reliable power sources) | |
| DECISION No 218c | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.9)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Seismic category will be corrected to 1. The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 218g | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.15)** |
| **Recommendation:** Item 7.7.2.5.3, 2nd paragraph  It is necessary to indicate the value of accuracy decrease during RP power determination under failures of the sensors | |
| **Reply** 218g | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.15)** |
| **Reply:** In RG 1.70 (see i. 7.7.2) there are no requirements for presentation of this information in i. 7.7.2.5.3 FSAR. From the analysis of the recommendations contained in NUREG-0800 (see i. 7.7.) it is seen that there is also no necessity to present the information of such character | |
| DECISION No 218g | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.15)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted. The text will be included in the FSAR, Revision 1 as follows: “The value of the reactor thermal power measurement accuracy reduction in case of failure of the sensors whose signals are used in the calculation of this power will be provided in the Operation Procedures” | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 221 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.16)** |
| **Recommendation:** Page 207, 2nd sentence from bottom  Indicate which adjacent systems information is transmitted to | |
| **Reply** 221 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.16)** |
| **Reply:** The sentence will be changed for the following: "transmittal of the information on position of all reactor CRs into MCDS, on position of CRs of groups 8…10 into NFME;" | |
| DECISION No 221 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.16)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 222 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.17)** |
| **Recommendation:** Fig.7.7-1 has no title. | |
| **Reply** 222 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.17)** |
| **Reply:** The comment is accepted. The title of the Figure "Structural diagram of GC PCPI" will be given | |
| DECISION No 222 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.17)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 225 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.20)** |
| **Recommendation:** Tables 7.7-4, 7.7-5  No logics of preventive protection signal generation is described | |
| **Reply** 225 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.20)** |
| **Reply:** In Tables 7.7-4 and 7.7-5 the formalized form is given for the algorithms of PP-1 and APP. The straight lines in the column “Logic” mean processing of signals by “2 out of 3” logic | |
| DECISION No 225 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.20)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 226 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.21)** |
| **Recommendation:** Table 7.7-6  Signal on position 5 is not used | |
| **Reply** 226 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.21)** |
| **Reply:** The comment is not accepted. The given signal is available in the list of APP signals | |
| DECISION No 226 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.21)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the following:  The Russian and English version of the table will be corrected. The word “system’ will be changed by “grid” | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 227 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.22)** |
| **Recommendation:** Page 207, last paragraph but one  Specify transmission of signals on the condition of RCP and feed water pump, RCP power supply frequency (i.e. from EPPS or primary transducers) | |
| **Reply** 227 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.22)** |
| **Reply:** The sentence will be corrected proceeding from the fact that no signals are transmitted into PG from the primary transducers | |
| DECISION No 227 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.22)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 (item 7.7.1.2.3) will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 231 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.27)** |
| **Recommendation:** Item 7.7.2.5.7.  It should be: "hot state" mode not "hot heat-up" mode | |
| **Reply** 231 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.27)** |
| **Reply:** comment is accepted. The text will be corrected | |
| DECISION No 231 | FSAR SECTION: 7  **FSAR Section 7.7 (4.4.7.27)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 will be corrected according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 232 | FSAR SECTION: 7  **FSAR Section 7 (4.4.8)** |
| **Recommendation:** Expert assessment of protection and interlocking algorithms of safety systems | |
| **Reply** 232 | FSAR SECTION: 7  **FSAR Section 7 (4.4.8)** |
| **Reply:** Comment is accepted.  The issues related to operation algorithms of safety systems equipment we suggest to be discussed at FSAR Chapter 6 review | |
| DECISION No 232 | FSAR SECTION: 7  **FSAR Section 7 (4.4.8)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** See reply 15 to OCE letter LTR-13070-63479 dated 14.12.05.  Updated algorithms will be included in Appendix D to Chapter 7 of the FSAR, Revision 1. The final version of the algorithms will be included in the FSAR after completion of commissioning | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

**OCE comments on Appendix B1 (to MoM to FSAR-7 (Rev. 0) dated 03-13.03.07, Tehran)**

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 1 | FSAR: 7  Item **7.4.1.4** |
| **Recommendation:** While time of development of FSAR-07, the TAs forinstrumentation cabinets of I&C-TС, I&C-TG was not finalized, please specify how the reiative section of FSAR –07 was developed without correct/final information | |
| Reply G-1 | FSAR: 7  Item **7.4.1.4** |
| **Reply:** Comments are not accepted.  FSAR gives general description of the I&C-TС, I&C-TG functions and structure principles which have not changed since the РSAR stage.  Guide 1-70 does not require more detailed information | |
| DECISION No 1 | FSAR: 7  Item **7.4.1.4** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** In Revision 1 of the FSAR it will be mentioned that I&C-TC and I&C-TG have a similar architecture with I&C-RC, and a reference to item 7.4.1.3 will be provided | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered**. | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 3 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Recommendation:** In table 7.2-2 “List of design initiating events of accidents determined by the specific accident signals” it seems that “difference between saturation temperature and maximum temperature in any hot leg less than 10°C” is related to the “Decrease of boric acid concentration, but it is not mentioned in table. Please clarify | |
| Reply 1 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Reply:** Signal "Difference between saturation temperature and maximum temperature in any hot leg less than 10°C" is a condition of reactor scram under the accidents pertained to primary pressure decrease (false injection into PRZ, PORV false opening, a spectrum of MCP breaks). This clarification will be introduced in FSAR during its correction | |
| DECISION No 3 | FSAR SECTION: Введение |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Comments are accepted and the reply will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No.5 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Recommendation:** In table 7.2-2, it seems that “large leaks with loss-of-coolant” and “primary-secondary leak within SG” also are initiating event causing actuation for “pressure above the core is below 14,7MPa at reactor power exceeding 75%Nnom” | |
| Reply 3 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Reply:** For criterion "pressure above the core is below 14,7Mpa at reactor power exceeding 75%Nnom" in columns " large leaks with loss-of-coolant" and "primary-to-secondary leak within SG " of Table 7.2-2 the respective revisions will be introduced | |
| DECISION No 5 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be introduced in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 6 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Recommendation:** In table 7.2-2, it seems that “small leaks with loss-of-coolant” and “large leaks with loss-of-coolant” are initiating event causing actuation for “excessive pressure in the containment is more than 0,029MPa”. Please clarify | |
| Reply 4 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Reply:** For criterion "excessive pressure in the containment is more than 0,029MPa" in columns " small leaks with loss-of-coolant” and “large leaks with loss-of-coolant” of Table 7.2-2 the respective revisions will be introduced | |
| DECISION No 6 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Reply is accepted and will be introduced in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 7 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Recommendation:**  In table 7.2-2 “small leaks with loss-of-coolant” is initiating event for “pressure above the core more than 17,5MPa”. Please clarify | |
| Reply 5 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| **Reply:** We confirm that PI signal more than 17,5 MPa is referred to the initiating event “small leaks with loss-of-coolant” | |
| DECISION No 7 | FSAR: 7  **FSAR 7.2, table 7.2-2** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted and will be corrected in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 10 | FSAR: 7  **FSAR 7.2, table 7.2-9** |
| **Recommendation:** In table 7.2-9 “logic of generation of emergency protection”. In item 10, in order to have EP signal, how many RCP are needed to be in status “started up” | |
| Reply 8 | FSAR: 7  **FSAR 7.2, table 7.2-9** |
| **Reply:** It is probably the comment is referred to item 10. The attribute of RCP status will be excluded | |
| DECISION No 10 | FSAR: 7  **FSAR 7.2, table 7.2-9** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NNSD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:**  In item 10 of table 7.2-9, the attribute of RCP status will be excluded from FSAR Rev. 1.  1st bullet- include "A given RCP" | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No.11 | FSAR: 7  **FSAR 7.2, table 7.2-9** |
| **Recommendation:** In table 7.2-9 “logic of generation of emergency protection”. Set point for “Seismic impact” item No.20 and “local power rate” item No.23 are different from the value given in PSAR. Please clarify | |
| Reply 9 | FSAR: 7  **FSAR 7.2, table 7.2-9** |
| **Reply:** We confirm the correctness of the setpoint value as to item 20.  Regarding linear heat rate (item 23) the reply is given in the enclosure | |
| DECISION No 11 | FSAR: 7  **FSAR 7.2, table 7.2-9** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The following information will be included in FSAR Rev. 1:  Table 7.2-9 regarding linear heat rate shall be changed as follows   |  |  | | --- | --- | | 23 Local power, W/cm (depends on the height of SPND location and the number of operating RCP sets), more than | 105 % qLinstalled | | Note. The setpoint value as to item 23 is determined in percentage of the absolute value of PP-2 setpoint corresponding to ultimate heat rate for the fuel rodQLadd. Its value depends on the number of operating RCP sets and is determined by the formula  qLinstalled=QLadd.·К1,2,3  where QLadd.=448 W/cm at Х < 177,5 and QLadd.=(596 - 0,8338·Х) W/cm at 177,5<Х<355,0;  Х- height from the core bottom, cm;  К1=1 (4 RCP sets in operation);  К2=0,46 (2 RCP sets in operation);  К3=0,76 (3 RCP sets in operation). | | | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 13 | FSAR: 7  **FSAR Section 7.3.1.2.6** |
| **Recommendation:** In chapter No. 7.3.1.2.6 of PSAR, the 9th paragraph has been eliminated in FSAR | |
| Reply 11 | FSAR: 7  **FSAR Section 7.3.1.2.6** |
| **Reply :** The text of para 9 of 7.3.1.2.6 of the PSAR repeats the of para 6, so it was deleted from the FSAR | |
| DECISION No 13 | FSAR: 7  **FSAR Section 7.3.1.2.6** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** In revision 1 of the FSAR paragraph 9 of the PSAR will be restored | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 15 | FSAR: 7  **FSAR Section 7.3.1.3** |
| **Recommendation:** In the 3rd row of the tableNo. 7.3.1.3-2 (page No. 120), the pressure set-points for opening and closing BRU-A are mentioned 7,17 and 6,3 МPа, whereas in algorithm Nos. RAS10EE001 to RAS40EE001 (page Nos. 7D-118 to 7D-129) the a.m. values are 7,15 и 6,27 МPа | |
| Reply 13 | FSAR: 7  **FSAR Section 7.3.1.3** |
| **Reply:** Comments are accepted.  Table 7.3.1.3-2 has been revised and attached | |
| DECISION No 15 | FSAR: 7  **FSAR Section 7.3.1.3** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Reply is accepted and will be introduced in the FSAR Rev. 1 as per attached table.  Table 7.3.1.3-2 continued   | **Initial events** | **Safety functions provided** | **Actuated systems** | **Automatic actuation** | **Remarks** | | --- | --- | --- | --- | --- | |  | primary pressure decrease; |  additional boron supply system, TW;   emergency gas removal system, YR; | Operator control |  | |  | \*— RP cooldown through the secondary circuit; | emergency cooldown system: RS, RA; | Operator control |  | |  | \*— residual heat removal through the secondary circuit; | emergency cooldown system: RS, RA; | 1. BRU-A opening Р2>7,15 MPa; 2. BRU-A closing Р2<6,27 MPa; 3. pump start-up, valves opening in the line of emergency feedwater LSG<-900 mm. |  | | 3 Secondary leak  (prior or after MSIV) | RP cooldown through the primary system; | LP ECCS and ТН10-40 line of smooth cooldown; | Operator control |  | |  | RP cooldown through the secondary system; | emergency cooldown system RS,RA; | Operator control |  | |  | \*— residual heat removal through the secondary system; | emergency cooldown system RS,RA; | 1. BRU-A opening Р2>7,15 MPa; 2. BRU-A closing Р2<6,27 MPa; 3. SG safety valve opening Р2>8,23 MPa; 4. SG safety valve closing Р2<6,86 MPa;   pump start-up and opening of emergency feedwater line valves LSG<-900 mm. |  | | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 17 | FSAR: 7  **APPENDIX** D |
| **Recommendation:** in the following algorithms of book 5 FSAR, the output signals have not been specified TFS21EZ001, TFS30EZ001, TFS31EZ001, TFS40EZ001 (page.7D-20, 7D-27, 7D-31, 7D-37) | |
| Reply 15 | FSAR: 7  **APPENDIX** D |
| **Reply:** Comments are not accepted  At present the process algorithms are being checked on the mathematical model of the power unit.  Then the algorithms check up is planned on the BNPP-1 power unit actual equipment during the functional testing and hot running-in.  Based on these activities results the actual algorithms variant will be developed, which will be introduced in to the final FSAR version | |
| DECISION No 17 | FSAR: 7  **APPENDIX** D |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawing will be submitted in Appendix A, B, C and D to chapter 7 of the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 18 | FSAR: 7  **APPENDIX A** |
| **Recommendation:** In page No.7А-249 of FSAR, the level transducers TWNOL001 A, B have been specified as redundant, whereas in the following algorithms, it has not been specified which of those level transducers have been used in this algorithm. If all redundant transducers have been sued, the respective preliminary signals processing logic ("And", "OR", "MEAN Value", "2 out of 3" …) shall also be specified.  TWS10EE007. TWS20EE007. TWS30EE007. TWS40EE007. TWS10EE014. TWS20EE014. TWS30EE014. TWS40EE014 | |
| Reply 16 | FSAR: 7  **APPENDIX A** |
| **Reply:** In all cases of application of excessive number of transducers - А, В or А, В, С – the signals processing logic is selected as "MEAN Value" | |
| DECISION No 18 | FSAR: 7  **APPENDIX A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** A reference to the Fig. 7.4-5 together with the reply will be added to FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 19 | FSAR: 7  **FSAR Section 6.3.1** |
| **Recommendation:** According to the page No.6.3.1.85 FSAR (chapter No. 6.3.1.2.3) set-points for alarming of transducer Nos. TWNOL001 are 25, 216 and 231whereas in page Nos. 7.А-250 to 259 the a.m. set points have not been specified | |
| Reply 17 | FSAR: 7  **FSAR Section 6.3.1** |
| **Reply:** Comments are accepted.  The set-points for alarming of TW tanks level and the transducers coordinates will be given in the FSAR Chapter 7 | |
| DECISION No 19 | FSAR: 7  **FSAR Section 6.3.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 20 | FSAR: 7  **APPENDIX A** |
| **Recommendation :** In page Nos. 7.А-250 to 254, coordinates for transducers TWNOL001А, В have not been specified | |
| Reply 18 | FSAR: 7  **APPENDIX A** |
| **Reply:** Comments are accepted.  The set-points for alarming of TW tanks level and the transducers coordinates will be given in the FSAR Chapter 7 | |
| DECISION No 20 | FSAR: 7  **APPENDIX A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Reply is accepted and will be included in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 21 | FSAR: 7  **APPENDIX D** |
| **Recommendation:** according to the algorithm Nos. TWS10EE001. YZS40EY001, YZS41EY001 and 1YZS60EY005, the primary condition of pumps operation is operation of diesel generator, whereas there are some operational status that the DG could be turn-off and pumps should be turn-on. For example, when there is any leakage in primary circuit, consumers will be supplied by external network, without any supplies from network power station or DG. In the other hand, DG should be turned-on when we could not supply, our electrical consumers from nuclear power station on external network | |
| Reply 19 | FSAR: 7  **APPENDIX D** |
| **Reply:** At present the process algorithms are being checked on the mathematical model of the power unit.  Then the algorithms check up is planned on the BNPP-1 power unit actual equipment during the functional testing and hot running-in.  Based on these activities results the actual algorithms variant will be developed, which will be introduced in to the final FSAR version | |
| DECISION No 21 | FSAR: 7  **APPENDIX D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawing will be submitted in Appendix A, B, C and D to chapter 7 of the FSAR Rev. 1. (see reply 15) | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 22 | FSAR: 7  **APPENDIX D** |
| **Recommendation:** In stage 0 of algorithm No**.** YZS40EY001 (cascade actuation)  The input signal "А04" of algorithm No. TWS10EE001 comes to status "1"and pump No. TW10D001 turns-on immediately whereas in stage 3 of algorithm No. YZS40EY001, the input signal "А06" of algorithm No. YZS40EY001 comes to status "1" after 30s delay. As a result, the output signal "В09" of algorithm No. 1YZS41EY001 comet to status "0" and at the same time if the input signals А03, А01 or А05 of algorithm No. TWS10EE001 come to status "1", the pump No. TW10D001 turns-on | |
| Reply 20 | FSAR: 7  **APPENDIX D** |
| **Reply:** At present the process algorithms are being checked on the mathematical model of the power unit.  Then the algorithms check up is planned on the BNPP-1 power unit actual equipment during the functional testing and hot running-in.  Based on these activities results the actual algorithms variant will be developed, which will be introduced in to the final FSAR version | |
| DECISION No 22 | FSAR: 7  **APPENDIX D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawing will be submitted in Appendix A, B, C and D to chapter 7 of the FSAR Rev. 1 (see reply 15) | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 23 | FSAR: 7  **APPENDIX D** |
| **Recommendation:** To check the operation of the valve TH15S012, in the condition that: the pump No. TH15D001 is on and the flow of the a. m. Pump is less than 35 m3/h, now if the water level in tank TH10В001 is more than 0,25 m, the valve No. TH15S012 will be open (algorithm No. TНS15EE010). In the other view of the valve No. TH15S012 operation, this valve shall be closed based on algorithm No. TНS15EE013 when the water level is lower than 0,25 m. These common set-points (0,25 м) for valve open and close conditions will actuate this valve in open/close status frequently. We believe that a trigger is necessary here to avoid that | |
| Reply 21 | FSAR: 7  **APPENDIX D** |
| **Reply:** At present the process algorithms are being checked on the mathematical model of the power unit.  Then the algorithms check up is planned on the BNPP-1 power unit actual equipment during the functional testing and hot running-in.  Based on these activities results the actual algorithms variant will be developed, which will be introduced in to the final FSAR version | |
| DECISION No 23 | FSAR: 7  **APPENDIX D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawing will be submitted in Appendix A, B, C and D to chapter 7 of the FSAR Rev. 1 (see reply 15) | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered**. | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 24 | FSAR: 7  **APPENDIX D** |
| **Recommendation :** In order to provide the suction flow of the residualhealremoval pump TH30D001 from the reactor coolant loop, it seems that a branch including a control valve (namely TH93S001) shall be used to connect the down-stream of the check-valve TH38S005 to upstream of the control valves TH91, 92, 94 S001 | |
| Reply 22 | FSAR: 7  **APPENDIX D** |
| **Reply:** At present the process algorithms are being checked on the mathematical model of the power unit.  Then the algorithms check up is planned on the BNPP-1 power unit actual equipment during the functional testing and hot running-in.  Based on these activities results the actual algorithms variant will be developed, which will be introduced in to the final FSAR version | |
| DECISION No 24 | FSAR: 7  **APPENDIX D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawing will be submitted in Appendix A, B, C and D to chapter 7 of the FSAR Rev. 1 (see reply 15) | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 25 | FSAR: 7  **APPENDIX A** |
| **Recommendation:**  In the "List of systems connected with ТН", (page No. 7.А-191) the TD and TH50-70 systems are not included whereas in the P&I drawing the a.m. systems are connected to ТН. Moreover, according to page No. 6.3.1-7 of FSAR (Ch. 6), the ТН system is interacting with the ТА and ТК systems and not interacting with the "TB, TD, TG, TP, YC, TP, TZ" systems. In contrast to page No. 6.3.1-7, the P&I (page No.7.А-191) "TB, TD, TG, TP, YC,TP,TZ" systems are connected to ТН. Also ТА and ТК systems are not connected to ТН | |
| Reply 23 | FSAR: 7  **APPENDIX A** |
| **Reply:** Comments are not accepted.  The purpose of functional diagrams is to indicate the number and location of the I&C transducers.  Therefore some ancillary processing lines are not given at P&I diagrams | |
| DECISION No 25 | FSAR: 7  **APPENDIX A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated P&I diagrams (in order to match them with Chapter 6) will be provided in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 38 | FSAR: 7  **FSAR 7.7.1.4.7** |
| **Recommendation:** For the purpose of consistency with CDDs, please change "System of integrated analysis" to "Comprehensive Analysis Server"(CAS).  Finally, please explain for not including "Secondary Leak Monitoring System"-SLMS2. | |
| Reply 36 | FSAR: 7  **FSAR 7.7.1.4.7** |
| **Reply:** We consider it inappropriate to change the terminology accepted in the MCDS design and corresponding to the regulatory documentation of Russian Federation (PNAE G-01-011-97) at this stage because such a procedure will result in revising the MCDS and APCS design.  **Description of secondary circuit leak detection system SOTT-2 is given in Chapter 3 FSAR** | |
| DECISION No 38 | FSAR: 7  **FSAR 7.7.1.4.7** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** A description of SOTT-2 will be provided in Revision 1 of the FSAR-07 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **АЕОI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 43 | FSAR: 7  **FSAR Section 7.1.1** |
| **Recommendation: Page 7-26:**  Considering the fact that functional modules related to electronic part of turbine governor system are a part of TPTS functional modules, three modules namely emergency automation module, power amplifier module and frequency conversion module should be described in the table 7.1.1-4 | |
| Reply 41 | FSAR: 7  **FSAR Section 7.1.1** |
| **Reply:** Comments are accepted.  Table 7.1.1-4 should be added by the following information:  Table 7.1.1-4 TPTS53 functional modules   |  |  |  | | --- | --- | --- | | Designation | Name | Function,  brief technical characteristics | | TPTS52.1412 | Emergency automation module | Designed for emergency control of TG turbine power in the automation systems based on TPTS53  The module is applied in a set with UM power amplifier | | TPTS52.1941 | Power amplifier module | TPTS52.1941 power amplifier module is designed for the control signal generated in the TPTS52.1412 emergency automation module and operates for the load (electromagnetic transducer) | | TPTS52.1724-01 | Frequency conversion module | Designed for signals conversion from rotation frequency sensors into DC voltage values corresponding to rotation frequency, rotation frequency change rate, and for commands generation | | |
| DECISION No 43 | FSAR: 7  **FSAR Section 7.1.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and will be included in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

**OCE comments on Appendix B2 (to MoM to FSAR-7 (Rev. 0) dated 03-13.03.07, Tehran, LIST OF REPLIES TO OCE LETTER No.LTR-13070-65287 DATED 18.02.06)**

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 3 | FSAR: 7  **FSAR Section 7.2, Table 7.2-2** |
| **Recommendation:** "Primary to secondary leak within SG Dnom < 100 mm" is mentioned as initiating event in supplement No.1 of PSAR, Chapter 7 causing actuation when "pressure in steam line (any) more than 7.84 MPa", whereas it is not included in table 7.2.2 of FSAR | |
| Reply 3 | FSAR: 7  **FSAR Section 7.2, Table 7.2-2** |
| **Reply:** The comment is accepted. In Table 7.2-2 for the condition “Pressure in steam line (in anyone) is more than 7,84 MPa” a respective mark will be made in column “Primary-to-secondary leak within SG (Dnom < 100 mm)” | |
| DECISION No 3 | FSAR: 7  **FSAR Section 7.2, Table 7.2-2** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 4 | FSAR: 7  **FSAR Section 7.2, Table 7.2-2** |
| **Recommendation:** "Spectrum of steam line breaks inside and outside the containment" is mentioned as initiating event in supplement No. 1 of PSAR, Chapter 7 causing actuation when "Excessive pressure in the containment is more than 0.29MPa", whereas it is not included in Table 7.2.2 of FSAR | |
| Reply 4 | FSAR: 7  **FSAR Section 7.2, Table 7.2-2** |
| **Reply:** “SB LOCAs (break of pipeline Dnom < 100)”, “LB LOCAs (break of pipeline Dnom>100)”, “Spectrum of steam line break inside and outside the containment” are the initiating events for EP initiation criterion “Excessive pressure in the containment is more than 0,29 MPa”.  For EP initiation criterion “Excessive pressure in the containment is more than 0,29 MPa” the marks will be made in the respective columns of Table 7.2-2 FSAR | |
| DECISION No 4 | FSAR: 7  **FSAR Section 7.2, Table 7.2-2** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 5 | FSAR: 7  **FSAR Section 7.2, Table 7.2-7** |
| **Recommendation:** In table 7.2.7 of FSAR the column for "maximum error" is not mentioned, while it exists in supplement No. 1 of PSAR, Chapter 7 | |
| Reply 5 | FSAR: 7  **FSAR Section 7.2, Table 7.2-7** |
| **Reply:** In Table 7.2-7 there is no column for maximum errors in connection with the fact that technical measures are provided to assure the reliability of system of ventilation and air-conditioning of primary transducer rooms. The temperature in rooms is maintained within the range of ± 2º С. In Chapter 7.2 no changes will be made | |
| DECISION No 5 | FSAR: 7  **FSAR Section 7.2, Table 7.2-7** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Additional materials will be provided during the commissioning license stage.(See replies 62 to NNSD comments) | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 10 | FSAR: 7  **FSAR Section 7.7** |
| **Recommendation:** Based on the PSAR supplement No.1, Chapter 7, the attached diagram shall be added to the FSAR, whereas it has not been given in FSAR, please add it | |
| Reply 10 | FSAR: 7  **FSAR Section 7.7** |
| **Reply:** Figure 7.7-3.1 given in Supplement No.1 to PSAR is replaced in FSAR with figure 7.7-5, which is more informative, in our opinion, because it contains the additional detailed information on interaction of APC with the adjacent systems. | |
| DECISION No 10 | FSAR: 7  **FSAR Section 7.7** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The Figure will be corrected (shadows will be removed) in FSAR Rev. 1. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 11 | FSAR: 7  **FSAR Section 7.4** |
| **Recommendation:** In page No. 7-148 of the FSAR Chapter 7, Figure 7.4-6, please note the followings:  a) The text "Formation of logic for the introduction of protection" which is directed to "R", shall be changed to "formation of logic for getting out of protection".  b) Please specify the reference point of "signal automatic introduction of protection" | |
| Reply 11 | FSAR: 7  **FSAR Section 7.4** |
| **Reply:** Figure7.4-6 shall be changed.  B2-Final resolution 7 spec2.jpg  Figure 7.4-6 Protection introduction/withdrawal unit | |
| DECISION No 11 | FSAR: 7  **FSAR Section 7.4** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and figure shall be corrected in FSAR Rev. 1. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 12 | FSAR: 7  **FSAR Section 7.4** |
| **Recommendation:** Concerning the Figure No. 7.7-4 of the FSAR (sheet No. 7-202), please consider our comments as follows:  a) Please add the figure's title as:  "Structure of sets of preventive protection equipment corresponds to the structure of reactor shutdown".  b) Connection between PPPE (KTSK-01R) and PG has been omitted, please add it.  c) Comparing figure No. 7.7-2 of the supplement No. 1 of the PSAR, Chapter 7 with figure No. 7.7.4 of the FSAR, please use the same abbreviations such as PPPE, NFME, etc. in figure 7.7.4 | |
| Reply 12 | FSAR: 7  **FSAR Section 7.4** |
| **Reply:** Figure 7.7-4, considering the given comment to English version of FSAR, is enclosed.    Note - The structure of the sets of preventive protection equipment correspond to the structure of reactor shutdown system  Figure 7.7-4 Structure of the sets of preventive protection | |
| DECISION No 12 | FSAR: 7  **FSAR Section 7.4** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The diagram will be updated in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 13 | FSAR: 7  **FSAR Appendix А** |
| **Recommendation:** Comparing the RS system's documents in chapters 7 and 10 of the FSAR there are some mismatch cases, for example:   * + In sheet No. 10.4.13.14 of the FSAR (Chapter 10) the "Alarm set point" of the parameter Nos. RS12/22/32/42F001 (pump RS12/22/32/42D001 flowrate) are ">75 and <25", whereas they have been mentioned as: "HA25 and HW25" in book 2 of FSAR, chapter 7, sheet 7.A-306 to 7.A-326.   In addition, the operation value of these items is 150, which is in conflict with "Alarming setpoint" that has been specified as "HA25 and HW25". Please clarify.  In sheet Nos. 10.4.13 to 15, the "Alarm set point" of parameter Nos. RS12/22/32/42 T002 (Temperature of the motor hot air) is ">110", whereas in book 2 of FSAR, Chapter 7, (sheet No. 7.A.308), "alarm set point" has not been mentioned (for instance: for item No. 11RS12T002 the relevant set point has not been mentioned). Please clarify | |
| Reply 13 | FSAR: 7  **FSAR Appendix А** |
| **Reply:** Atpresentthe procedure of process systems running on the unit mathematical model takes place at which the operation modes of pumping and ventilation units, etc. are being specified. Concurrently the signal settings for these units are being corrected. Similar work will be performed as per the results of the commissioning and trial running of the unit. At completion of these stages the final changes will be introduced in the FSAR | |
| DECISION No 13 | FSAR: 7  **FSAR Appendix А** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 14 | FSAR: 7  **FSAR Appendix А** |
| **Recommendation:** Comparing P&ID diagrams of the RS system in the FSAR book 2 of chapter 7 and chapter 10 (sheet Nos. 7.A.305 and 10.4.13-5 respectively), the emergency filling branch of the tank Nos. RS10B001, 2, 3 & 4 has not been given in FSAR, Chapter 10, please clarify | |
| Reply 14 | FSAR: 7  **FSAR Appendix А** |
| **Reply:** Atreconciliation of РSAR Chapter 10 the emergency filling of DM water tanks was excluded (See Figure 10.4.13.2.1-1 of FSAR Chapter 10) | |
| DECISION No 14 | FSAR: 7  **FSAR Appendix А** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 15 | FSAR: 7  **FSAR Appendix А and D** |
| **Recommendation:** Concerning book 2 of the FSAR Chapter 7, sheet Nos. 327 to 336 (VJ system), please find our comments as follows:   * + There are some mismatched cases concerning set  points between FSAR and document No. 29.BU.1ZK2.0.AK.AL.RDR001 (such as: on page No. 8, item No. 11VJ10T002, alarming set point has been mentioned as "HW>45", whereas it has not been mentioned in FSAR, Chapter 7, sheet No. 7.A-333). Please clarify.   + There are some mismatched cases in "Alarming set point" between FSAR and Doc. No. 29.BU.1ZK2.0.AK.AL.RDR001 (such as: in item No. 1188, entitled as 11VJF00A, the "Alarming set point" is "HA 510, HW 510 & HT400" in the FSAR, whereas it has been mentioned as "LW<50 & LA<400" in Doc. No. 29.BU.1ZK2.0.AK.AL.RDR001, page 8).   + The algorithm entitled as VJS11EH001, has not been identified in sheet 7.D.239 to 7.D.258 of book 5 of FSAR, Chapter 7, "algorithms of protections and interlocks secured closed cooling water system VJ ZK1, ZK2 BUILDING", whereas it has been specified for some VJ system parameters such as 11VJ11F001B, sheet No. 7.A-333 (book 2 of FSAR, Chapter 7). Please add the a.m. algorithm to VJ algorithm section 7.D.10 (sheet 7.D.239 to 7.D.258) | |
| Reply 15 | FSAR: 7  **FSAR Appendix А and D** |
| **Reply:** Atpresentthe procedure of process systems running on the unit mathematical model takes place at which the operation modes of pumping and ventilation units, etc. are being specified. Concurrently the signal settings for these units are being corrected. Similar work will be performed as per the results of the commissioning and trial running of the unit. At completion of these stages the final changes will be introduced in the FSAR | |
| DECISION No 15 | FSAR: 7  **FSAR Appendix А and D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 16 | FSAR: 7  **FSAR Appendix А and D** |
| **Recommendation:** The functional diagrams and algorithms for a number of systems have been mentioned in book 2, 4 and 5 of FSAR, Chapter 7, please specify how the systems have been selected to be included in FSAR and why algorithms for a number of the important systems (such as: YB, YC, YA, …) have not been taken in to consideration | |
| Reply 16 | FSAR: 7  **FSAR Appendix А and D** |
| **Reply:** InBooks2, 4 and 5 of FSAR Chapter 7 the functional diagrams and algorithms for the main process systems mentioned in Book 1, are given.  They relate to safety systems and unit shut down systems | |
| DECISION No 16 | FSAR: 7  **FSAR Appendix А and D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 20 | FSAR: 7  **FSAR Appendix А** |
| **Recommendation:** The "RL" process diagram represented in the Figure A.18 (page No. 276 of book 2 of FSAR-7) is not completely compatible with the figure No. 10.4.6.2.2.1.2-1 (page No. 10.4.6-17 of chapter 10) there are considerable differences between the a.m. figures, please clarify these inconsistency and correct them accordingly | |
| Reply 20 | FSAR: 7  **FSAR Appendix А** |
| **Reply:** The purpose of functional diagrams is to indicate the number and location of I&C transducers. Therefore some auxiliary process lines at functional diagrams are missed | |
| DECISION No 20 | FSAR: 7  **FSAR Appendix А** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 of FSAR, it will be corrected.(See reply 82) | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 21 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** On page No. 7.A-296 of the FSAR, book 2 of Chapter 7, the transducer "11XQ01P001A" (item No. 1228) has been referred to algorithm No. YCS05ER101, whereas this transducer has not been used as input to the a.m. algorithm (page No. 14 of Doc. No. 28.BU.1ZA.YC.AT.TB.RDR009, letter No. 02.1/02-4734 dated 12.03.03). The same problem exists for the following items:  1228, 1229, 1230, 2636, 2638, 2639, 2656, 2657, 2658, 2600, 2607, 2608 | |
| Reply 21 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Atpresentthe procedure of process systems running on the unit mathematical model takes place at which the operation modes of pumping and ventilation units, etc. are being specified. Concurrently the signal settings for these units are being corrected. Similar work will be performed as per the results of the commissioning and trial running of the unit. At completion of these stages the final changes will be introduced in the FSAR | |
| DECISION No 21 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 22 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** On page No. 7.A-296 of book 2 of the FSAR, Chapter 7, the transducer "11XQ01P001A" (item No. 1228) has not been referred to algorithm No. YCS05EY105 whereas this transducer has been used as input to the algorithm YCS05EY105 (page No. 14 of the Doc. No. 28.BU.1ZA.YC.AT.TB.RDR009).  The same problem exists for the following items:  1228, 1229, 1230, 2636, 2638, 2639, 2656, 2657, 2658, 2600, 2607, 2608 | |
| Reply 22 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Atpresentthe procedure of process systems running on the unit mathematical model takes place at which the operation modes of pumping and ventilation units, etc. are being specified. Concurrently the signal settings for these units are being corrected. Similar work will be performed as per the results of the commissioning and trial running of the unit. At completion of these stages the final changes will be introduced in the FSAR | |
| DECISION No 22 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 23 | FSAR: 7  **FSAR Appendix А** |
| **Recommendation:** On page number 7. A-296 FSAR, Book 2, Chapter 7, transducer "11XQ01P001A" (element No. 1228) was mentioned with regard to algorithm No. YCS05ER101, but this sensor was not used as input to the above-mentioned algorithm (page No. 14 Document No. 28. BU1ZA.YC.AT.TB.RDR009, letter No. 02.1/02-4734 dated 12.03.03). The same problem exists for the following items: 1228, 1229, 1230, 2636, 2638, 2639, 2656, 2657, 2658, 2600, 2607,2608 | |
| Reply 23 | FSAR: 7  **FSAR Appendix А** |
| **Reply:** Atpresentthe procedure of process systems running on the unit mathematical model takes place at which the operation modes of pumping and ventilation units, etc. are being specified. Concurrently the signal settings for these units are being corrected. Similar work will be performed as per the results of the commissioning and trial running of the unit. At completion of these stages the final changes will be introduced in the FSAR | |
| DECISION No 23 | FSAR: 7  **FSAR Appendix А** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 24 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** Measuring range of the following transducers (on page Nos. 7.A-296-304 of book 2 of FSAR, Chapter 7 is not compatible with maximum parameters values.  11XQ01P001A,B,C, 11XQ01P007A,B,C, 12XQ01P002A, B, C, 12XQ01P006A,B,C, 12XQ01P008A, B,C, 13XQ01P003A, B,C, 13XQ01P009A, B, C, 14XQ01P004A, B,C, 14XQ01P010A, B, C | |
| Reply 24 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** The given transducers are intended for control of underpressure in containment at NO modes and signal generation for ventilation isolation valves closing at pressure rise up to 3 kPa. At LOCA type accident these transducers do not operate | |
| DECISION No 24 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** the FSAR Rev. 1, the value of 0.5 KPa should be changed to 0.5 MPa | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 25 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** The following transducers have been specified in page No. 7.A-276 of book 2 of the FSAR, Chapter 7, (RL-functional diagram) whereas they have not been mentioned in page Nos. 7.A-277-279.  RL61P002, RL61P001, RL61P001D, RL61T001, RL61F001A,B,D RL71P001, RL71P001D, RL71F001 A,B,D | |
| Reply 25 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Issue requires explanations**.** The mentioned transducers are given both in page А-276, and also in pages А-277…279 | |
| DECISION No 25 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** In FSAR Rev. 1, the comment will be considered | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 26 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** While there is leak in SG1, the "BRU-A" valve of SG1 shall not be opened, therefore the output of algorithm No. 1YZS60EY005 (page No. 7.D-80 of book 4, chapter 7 of FSAR) specified as B01 shall be changed as follows:  New B01 into algorithm No. RAS10EE001  B01  &  A01  The same approach should be applied to algorithm No.2YZS60EY005, 3YZS60EY005 and 4YZS60EY005 | |
| Reply 26 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** From output В01 of algorithm No. 1YZS60EY005 the signal is transmitted for switching on the cooling down through "BRU-A" valve of SG1, if there is leak in any other SG.  Changes are not required | |
| DECISION No 26 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 30 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** A trigger function shall be added to algorithm No. TWS10EE007 or TWS10EE014 (page Nos. 7.D-44 and 7.D-61 of book 5, chapter 7 of FSAR).Operation of the algorithm Nos. TW10EE007 and TWS10EE008 shows that the valve No. TW10S009 will be closed when pump No. TW10D001 is on (100%) and level in tank Nos. TW10B003 and TW10B004 is less than 0.25m, moreover the algorithm No. TWS10EE014 leads the a.m. valve to be opened in two different situations; firstly, the pump No. TW10D001 is off (0%) and the a.m. tanks' level is more or equal to 0.25m. Secondly, the pump No. TW10D001 is on because of the existence of leak in SG and again the a.m. tanks' level is more or equal to 0.25m. Consequently, it seems that the common set-point (0.25) for valve opening and closing conditions (when there is leak) will cause the valve be opened and closed frequently. To avoid it, we believe that a trigger function shall be added to the a.m. algorithms | |
| Reply 30 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** The given situation might have a place in case we are facing two failures: check valve is leaky and the valves are leaky. Their tightness level can be checked at setting activities stage. In the worst case the command from interlock of TWS10-40EE008 might be performed with ban on opening | |
| DECISION No 30 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 31 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In algorithm No. TWSN0EE011 (page No. 7.D-58 of book 5 of FSAR, Chapter 7), it has been referred to gate valve No. TWN0S023 whereas the a.m. gate valve has not been specified in the functional diagram of TW(page No. 7.A-249 of book 2 of FSAR, Chapter 7) and ancillary system for borating pump TWN0D001 (page 45 of Doc. No. 29.BU.1ZAB.0.AK.OK.RDR001, letter No. 04/02-13307 dated 29.08.04) | |
| Reply 31 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** The given valve is given in TWS10-40D001 pumps piping diagram | |
| DECISION No 31 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 33 | FSAR: 7  **FSAR Appendix В** |
| **Recommendation:** The MCR layouts of panels and desks given in book 2&3, should be in accordance with the related last version | |
| Reply 33 | FSAR: 7  **FSAR Appendix В** |
| **Reply:** In FSAR Chapter 7 (Book 3) the last version of the MCR layouts of panels and desks, submitted to the manufacturing plant, is presented | |
| DECISION No 33 | FSAR: 7  **FSAR Appendix В** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 34 | FSAR: 7  **FSAR Appendix В** |
| **Recommendation:** The given MCR layouts are not complete. Some layouts of desks have not been given | |
| Reply 34 | FSAR: 7  **FSAR Appendix В** |
| **Reply:** In FSAR Chapter 7 (Book 3) the front panels of the desks described in section 7.5 of Book 1 ("Safety systems reactor control visual devices") | |
| DECISION No 34 | FSAR: 7  **FSAR Appendix В** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 36 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** Referring to the FSAR, Chapter 7, sheet Nos. 7.A-8 to 16, in YC system, English notes to be added beside Russian notes. For example, in sheet No. 7.A-10, "WS" of "Analog" column for items namely 10YC00P020, 10YC00P021, 10YC00P022, MCR-SP & ECR-SP to be added | |
| Reply 36 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Comment is accepted.  The given changes will be considered at documentation revision | |
| DECISION No 36 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 37 | FSAR: 7  **FSAR Appendix A and D** |
| **Recommendation:** Comparing FSAR, chapter 7, Book2 and FSAR, chapter 7, Book 5 there are many parameters which have been specified by A,B and C in the former document, but in the letter document sensors are not divided as three independent sensors as inputs of algorithms. For example algorithm namely TAR80EZ001 has been specified as "Designation" of parameters namely 10YC00P007A,B&C (The first document sheet No. 7.A-8). However in the second document (sheet no. 7.D-97) just YC00P007 has been mentioned as input of algorithm TAR80EZ001. It seems that the relation of each sensor as input of each algorithm shall be shown clearly. This is the case for many other algorithms of YD system. Please clarify | |
| Reply 37 | FSAR: 7  **FSAR Appendix A and D** |
| **Reply:** In general case in inputs of process algorithms the control points are indicated, but not sensors (i.е. without А, В, С), as usually in the process algorithm the parameter measuring process method is not considered | |
| DECISION No 37 | FSAR: 7  **FSAR Appendix A and D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** A clarification will be attached to the process algorithms how to use them, in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 41 | FSAR: 7  **FSAR Appendix A and D** |
| **Recommendation:** On page No. 7.A-22 of book 2, Chapter 7, FSAR, the transducers 11YB10L003A, B, C are referenced as input to the algorithms RLS61EE003, 4, whereas the a.m. algorithms have not been included in page Nos. 7.D-164-191 of book 5, Chapter 7, FSAR ("Algorithm of protections & interlocks main feed water system-RL"). The same problem exists for transducer Nos. YB20/30/40L003A, B, C | |
| Reply 41 | FSAR: 7  **FSAR Appendix A and D** |
| **Reply:** Atpresentthe procedure of process systems running on the unit mathematical model takes place at which the operation modes of pumping and ventilation units, etc. are being specified. Concurrently the signal settings for these units are being corrected. Similar work will be performed as per the results of the commissioning and trial running of the unit. At completion of these stages the final changes will be introduced in the FSAR | |
| DECISION No 41 | FSAR: 7  **FSAR Appendix A and D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 42 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** The transducer Nos. 10YB51T001 and 10YB51T002 have been mentioned on page No. 7.A-21 of book 2, Chapter 7, FSAR, whereas on page No. 7.A-17 of the a.m. book (figure A.2, building ZA/B, functional diagram for P.M. steam generator YB10) they have not been specified. The same problem exists for transducer Nos. "10YB52T001, 2", "10YB53T001, 2",and "10YB54T001, 2" | |
| Reply 42 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Comment is accepted.  The given changes will be considered at documentation revision | |
| DECISION No 42 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the comment | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 43 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** According to the page No. 7.A-20 of book 2, Chapter 7, FSAR, the transducer Nos. 10YB10P006 and 10YB10P007 have been used for monitoring of tightness of SG flange connection in the secondary circuit and transducer Nos. 10YB10P004 and 10YB10P005 have been used for monitoring of tightness of SG flange connection in the primary circuit, whereas on the page No. 7.A-17 of the a.m. book the transducers 10YB10P006 and 10YB10P007 have been specified in SG flange connection in the primary circuit and the location of transducer Nos. 10YB10P004 and 10YB10P005 is not clearly specified. The same problem exists for transducer Nos. YB20/30/40P004-7 | |
| Reply 43 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Comment is accepted.  The given changes will be considered at documentation revision | |
| DECISION No 43 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the comment | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 44 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** On page Nos. 7.A-27 and 28 of book 2, Chapter 7, FSAR, the transducers 11YB20L001A, B, C and 12YB20L002A, B, C are referred as input to the algorithm Nos. YCS01EY123 and 10YCS01EY223 respectively, whereas the a.m. transducers have not been used as input in the a.m. algorithms (page Nos. 15 and 37 of Doc. No. 28.BU.1ZA.YC.AT.TB.RDR003, letter No.02.1/02-8440). The same problem exists for transducer Nos. 11YB30L001A, B, C, 12YB30L002, A, B, C, 11YB40L001A, B, C and 12YB40L002A, B, C | |
| Reply 44 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Comments are accepted. Supplement А will be revised. Expected date is August 2006 | |
| DECISION No 44 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the comment | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 47 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** The valve Nos. YP21, 22, 23S006, 7 shall be shown as normally closed valves. Please use the correct symbol | |
| Reply 47 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** The purpose of functional diagrams is to indicate the number and location of I&C transducers. Therefore some auxiliary process lines at functional diagrams are missed | |
| DECISION No 47 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The P&ID shall be corrected | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 53 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** In the a.m. sheet, only one sensor for measuring the pressure in the relief tank has been considered whereas in FSAR Chapter 5, two sensors have been considered | |
| Reply 53 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** FSAR Chapter 5 should be corrected | |
| DECISION No 53 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted. FSAR Chapter 5 should be corrected according to the comment by Contractor | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 55 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** In the a.m. sheet measuring circuit Nos. 11YP10L00A, B, C has not been given in P&ID diagram (sheet No. 7.A-41) | |
| Reply 55 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** The purpose of functional diagrams is to indicate the number and location of I&C transducers. Therefore some auxiliary process lines at functional diagrams are missed | |
| DECISION No 55 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The P&ID shall be corrected | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 58 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In the a.m. sheet, input No. A01 of all of the algorithms comes from algorithm No. YCR00EY001, whereas in this algorithm it has not been referred to the a.m. algorithms | |
| Reply 58 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** In the a.m. sheet the mentioned reference is missed. Apparently the cases in point are the sheets 318 and 319. In the absent in the FSAR algorithm YCR00EY001 there is a direct command for tripping of the PRZ Tubular Electric Heater instead of reference to algorithms YР10ЕE001-008 | |
| DECISION No 58 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 59 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation: :** The a.m. two comments are valid for algorithms given in sheet No. 7.D-313 | |
| Reply 59 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** In the a.m. sheet the mentioned reference is missed. Apparently the cases in point are the sheets 318 and 319. In the absent in the FSAR algorithm YCR00EY001 there is a direct command for tripping of the PRZ Tubular Electric Heater instead of reference to algorithms YР10ЕE001-008 | |
| DECISION No 59 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 61 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In sheet No. 7.D-316, comment No. 9 is valid for all of the algorithms | |
| Reply 61 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** Apparently the case in point is sheet 330. In this case we inform that the reference to algorithm YPS21EZ003 relates only to algorithms YPS21EZ003 and YPS23EZ003 of additional control line of Pulse-Safety Device | |
| DECISION No 61 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 63 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** The given reactor pressure which cause the Injection valves YP11, 12, 13S002 be opened are not the same in algorithm Nos. YPR10EY005 and YPR10DP001 (which one is correct? 16.7 or 16.07 MPa) | |
| Reply 63 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** Thepressure value of 16.7 MPa is determined by OKB "Gidropress" for opening of YP11, 12S001 | |
| DECISION No 63 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply will be completed as follows: “Setpoint 16.07 MPa is for closed-loop operation, 16.7 MPA is a protection setpoint. It will be considered in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 68 | FSAR: 7  **FSAR Appendix А** |
| **Recommendation:** In sheet No. 7.A-42, it seems that the given HW (4.8) and HT(4.8) for measuring circuit Nos. 10YP10L004A, B, C are incorrect (operating values are 8.2m) | |
| Reply 68 | FSAR: 7  **FSAR Appendix А** |
| **Reply:** It is incorrect in the FSAR. It should be: LW<4.8, LA<4.2, HA>4.2, HW>8.4. It will be corrected | |
| DECISION No 68 | FSAR: 7  **FSAR Appendix А** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted. It will be corrected in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 69 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** In sheet No. 7.A-45, it seems that the given HA and HW (1.5m) for measuring circuit Nos. 10YP20L001A, B are incorrect (operating values are 1.7m) | |
| Reply 69 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** It should be: LW<1.5 | |
| DECISION No 69 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted. It will be corrected in the FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 70 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation: :** In sheet Nos. 7.A-46 and 7.A-47, signal from level meter Nos. 11, 12YP10L001A, B, C go to algorithm Nos. 1, 2, 3, 4YZ60EY001, 2, 3, 4, 5. In the a.m. algorithms respective logics have not been indicated and only one sensor has been mentioned | |
| Reply 70 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** In algorithms YZS60EY001-005 the following level measurements are used in PRZ:  1YP10L001 in algorithms 1YZS60EY001-005, 4YZS60EY001-005;  2YP10L002 in algorithms 2YZS60EY001-005, 3YZS60EY001-005 | |
| DECISION No 70 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 72 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** According to the table No. 5.1.2-1 of Chapter 5, FSAR, sheet No. 5-13, number of check points for temperature measurement in the cold leg of each loop is 12, whereas in page No. 7.A-48 of FSAR, book 2, Chapter 7, 11 check points have been specified for temperature measurement in the cold leg of loop 2&4. please verify | |
| Reply 72 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Number of check points for temperature measurement in the cold leg of each loop is 12 | |
| DECISION No 72 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 74 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** According to the table No. 5.1.2-1 of Chapter 5, FSAR, sheet No. 5-13 ("list of check points of the main coolant pipeline"), in each loop it should be 2 sensors for measuring of pressure pulsation on the RCP set suction and head and one sensor for measuring of pressure pulsation at the reactor outlet that should be connected to the MCDS whereas on page No. 7.A-48 of book 2, chapter 7, FSAR, the a.m. sensors have not been specified | |
| Reply 74 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** For measurements on the primary circuit the following meterings are considered:  Pressure difference at RCP YA10-40P01 – for EP  Pressure difference at RCP YA10-40P02 – for EP  Pressure difference at RCP YA10-40P03 – for RP MCDS  Pressure difference at RCP YA10-40P04 – for RP MCDS  Pressure difference at SG YA10-40P05 – for MCR monitor  Pressure at RCP head - for MCR monitor | |
| DECISION No 74 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 79 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** On page Nos. 7.A-57, 60 & 63 of book 2, Chapter 7, FSAR  for the following transducers, please specify the type of alarms (HA, LA, HW, LW, …) 11YA11T003A, B, C, 11YA21T003A, B, C, 11YA31T003A, B, C | |
| Reply 79 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Temperature alarm LT<70 and LW<150 are used not for detection of emergency cases, but to inform the operator at cool down that the protections are not available | |
| DECISION No 79 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted. The related page will be corrected | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 82 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** On page No. 7.A-85 of book 2, chapter 7, FSAR (YT P&I diagram), all of the pipelines have been connected to the outlet chamber of the reactor whereas according to the page No. 7.A-7 of book 2, chapter 7, FSAR (YC P&I diagram) and 6th paragraph of chapter 6.3.1.3.2.4 of FSAR, two pipelines shall be connected to the outlet chamber of the reactor and two pipelines shall be connected to the inlet chamber of the reactor | |
| Reply 82 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** The purpose of functional diagrams is to indicate the number and location of I&C transducers. Therefore some auxiliary process lines at functional diagrams are missed | |
| DECISION No 82 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** It will be corrected in the final version of the FSAR | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 83 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** On page No. 7.A-85 of book 2, chapter 7, FSAR, the motorized valves YT11/12/13/14S005-8 have been identified as normally open valves, whereas according to the 2nd paragraph of page No. 6.3.1-101, Chapter 6, FSAR, the a.m. valves shall be identified as normally- close valves | |
| Reply 83 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** The purpose of functional diagrams is to indicate the number and location of I&C transducers. Therefore some auxiliary process lines at functional diagrams are missed | |
| DECISION No 83 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** It will be corrected in the final version of the FSAR | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 93 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** Alarming set points for some instruments such as 10YD10P001A, 1B, 1C do not seem to be correct (HA= 0.98, HW=0.98), please clarify. 93- In some cases "HW" for alarming set points have not been specified. As an example, please note for 10YD10T006, 10YD10T007A, 10YD10T007B, 10YD10T007, etc. Being this the case, all the alarming set points for RCPs should be checked again and reviewed throughout the document | |
| Reply 93 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Given value of 0.98 MPa is specified by the RCP designer. It should testify on RCP glands failure. At NO the value is much higher. For points YD10T006 and YD10T007 HW>110, HА>120 are stipulated | |
| DECISION No 93 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted. The text will be corrected in FSAR Rev. 1. | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 99 | FSAR: 7  **FSAR Appendix A and D** |
| **Recommendation:** Whilst the algorithm, entitled "YDR30EY009", has been specified as designation of items 13YD30T002A, B&C (FSAR, Chapter 7, Book 2, sheet 7.A-144), these items are not mentioned as inputs of "YDR30EY009" (FSAR Chapter 7, Book 5, sheet 7.D-282). Please clarify | |
| Reply 99 | FSAR: 7  **FSAR Appendix A and D** |
| **Reply:** Algorithms in the FSAR should be corrected due to the following:  In algorithm YD10EY009 signal from YD10T001 is used;  In algorithm YD20EY009 signal from YD10T002 is used;  In algorithm YD30EY009 signal from YD10T002 is used;  In algorithm YD40EY009 signal from YD10T001 is used; | |
| DECISION No 99 | FSAR: 7  **FSAR Appendix A and D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and FSAR Rev 1 shall be corrected according to reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 100 | FSAR: 7  **FSAR Appendix A and D** |
| **Recommendation:** Same as above comment, whilst the algorithm "YDR40EY003", has been specified as designation of items namely 14YD40T001A,B&C(FSAR, chapter 7, Book 2, Sheet 7.A.147), these items are not mentioned as inputs of "YDR40EY003" algorithm (FSAR, chapter7, Book5, sheet 7.D-272). Please clarify | |
| Reply 100 | FSAR: 7  **FSAR Appendix A and D** |
| **Reply:** Algorithms in the FSAR should be corrected due to the following:  In algorithm YD10EY003 signal from YD10T001 is used;  In algorithm YD20EY003 signal from YD10T002 is used;  In algorithm YD30EY003 signal from YD10T002 is used;  In algorithm YD40EY003 signal from YD10T001 is used; | |
| DECISION No 100 | FSAR: 7  **FSAR Appendix A and D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted and FSAR Rev 1 shall be corrected according to reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 103 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** Comparing Doc. No. 29.BU.1ZAB.0.AK.OK.RDR001-12 with contents of FSAR, chapter 7, Book2 (page 7.A-3), "VF" should be changed in to "VE" as follows:  "Building ZA/B. functional for PM. Service cooling water system VE for secured closed cooling water system TF-VJ". This comment should also be applied on the title of Fig.A.11 (FSAR chapter7, Book2 sheet No. 7.A-148) | |
| Reply 103 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** The comments are accepted. Supplement А will be revised. Revision tentative date is August 2006 | |
| DECISION No 103 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted and FSAR Rev. 1 shall be corrected according to comment | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 104 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** Comparing Figure A.11 (FSAR chapter 7, Book2, sheet No. 7.A-148) and Figure 6.3.2.2-1 (FSAR chapter 6, Book3 sheet No. 6.3.2-42) there are some non compliances with these two figures such as:  A) VJ30F001 and VJ20F001 in Fig. No. 6.3.2.2-1 has not been specified in Figure A.11, please clarify.  B) VE30F002 and VE20F002 in Fig. No. A11 has not been specified in Fig. 6.3.2.2-1. Please clarify.  C) For the portion of VE system that has specified in ZK1 building:   * 1. VL82 and VL83 branches have not been shown in Figure 6.3.2.2-1. Please verify.   104-2 The icon of VJ30F001 ""in Fig. No.6.3.2.2-1 is in contrast to VE30F002" in Fig.A11. Please clarify | |
| Reply 104 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** A) Check points of the system VJ cannot be shown in this Figure, as they relate to system VE.  B) Given сheck points VE are located in the part of the system which is in the ZK building. Therefore they are not required in the Figure А11, which relates to part of the system which is in the ZA/B building.  C) Figure А11 shows in details only that relates to part of the system which is in the ZA/B building | |
| DECISION No 104 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Chapter 6 should be corrected | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 105 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** In FSAR, Chapter 7, Book2 sheet No. 7.A-148, please specify the location of VE23D001, VE22D001, VE31D001 and other pumps and equipment which are in ZM4 and ZM5 Building | |
| Reply 105 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** See Reply to comment 104 С), as Figure А-148 is Figure А-11 | |
| DECISION No 105 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Chapter 6 should be corrected | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 106 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** In the following table, the operating value for transducers is higher than high alarm setpoint value as example: the operating value for transducer No. 10TH71P002A is 0.75Mpa, whereas the high alarm setpoint is 0.4. Please verify.   |  |  |  |  | | --- | --- | --- | --- | | **Transducer** | **Operating value** | **Alarm set point** | **Address of book 2, Chapter 7, FSAR** | | 10TH71P002A, B | 0.75 MPa | HA 0.4 | 7.A-193 | | 10TH72P002A, B | 0.75 MPa | HA 0.4 | 7.A-193 | | 10 TH 75L001 | 0.05-0.4 m | HA 0.37  HW 0.5  HT 0.05 | 7.A-194 | | 10 TH 60L001 | 13.55 m | HA 13.45  HW 13.45  HT 12.55 | 7.A-207 | | 11 TH 60L003 | 13.55 m | HA 9.0 | 7.A-208 | | 11 TH 60L004 | 13.55 m | HA 6.0 | 7.A-208 | | 12 TH 60L002 | 13.55 m | HA 13.45  HW 13.45  HT 12.55 | 7.A-221 | | 12 TH 60L005 | 13.55 m | HA 9.0 | 7.A-221 | | 12 TH 60L006 | 13.55 m | HA 6.0 | 7.A-221 | | |
| Reply 106 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** For check point TH71P002 it should be LW < 0.4 MPa. For check point TH72P002 it should be LW < 0.4 MPa.  For check point TH75L002 it should be LW < 0.05 m,. HW > 0.13 m, HA > 0.37m. For check point TH60L001 it should be LW < 13.45 m,. LA < 12.55 m, HW>13.65 m.  For check point TH60L002 it should be LW < 13.45 m,. LA < 12.55 m, HW>13.65 m  Check points TH60L003,004,005,006 are discrete signalizers of low level LA < 6.0 m. Analog value is not measured. For these points the values of rated, min and max levels are given as reference | |
| DECISION No 106 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted and FSAR Rev.1 shall be corrected | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 107 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In algorithm TAR13EE001 page 7.D.73 of book5 FSAR Chapter 7, the output signal "B06" refer to the algorithm TAR13EE02 whereas this algorithm does not exist in "algorithms of protections and interlocks volume control system TA" page 7.D-68 to 7.D-104, Book 5, FSAR | |
| Reply 107 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** В06 of the given algorithm should refer to algorithm TAR10FF902 | |
| DECISION No 107 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 108 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In algorithm TAR10FF902, A01 signal is received from "B06" output of algorithm TAR13EE001 whereas "B06" output of algorithm TAR13EE001 is not sent to the TAR10FF902 | |
| Reply 108 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** Input А01 of the given algorithm should refer to algorithm TAR13ЕЕ001 | |
| DECISION No 108 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 109 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** For algorithms No. TAR10EZ002, two input signals have been named as "A03" (for interlock TAR00EY001 and operator command). Moreover, for algorithm Nos. TAR5NEZ001, two input signals have been named as "A02" (for temperatures YDN0T001 and YDN0T002) which are not correct. Please note that these comments were accepted in item No. 4 letter No. 04/02-25048 dated 04.12.05 but not implemented in FSAR | |
| Reply 109 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** Input from operator should have marking А04 | |
| DECISION No 109 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 110 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In algorithm TAR00EY001, the output of flip-flap that is regulated by operator should be changed to mode "not" before entering to unit "&". Please note Item 1 letter No. 04/02-25048 dated 04.12.05 | |
| Reply 110 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** Algorithm is performed correct. Operator can stop the interlock operation for 5 min for blow down connecting after short-term make-up water closing at intermediate modes | |
| DECISION No 110 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted. Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 111 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In the following algorithms, the type and title of the operator command in the respective input signals have not been specified.  Please be informed that this comment was accepted in Item 3 of the letter No. 04/02-25048 dated 04.12.05 previously.   |  |  | | --- | --- | | **Algorithm No.** | **Input No.** | | TAR10EZ001 | A02 | | TAR10EZ002 | A03 | | TAR20EZ001 | A04, A05 | | TAR31EZ001 | A09 | | TAR32EZ001 | A09 | | TAR33EZ001 | A09 | | TAS64EZ001 | A03 | | TAS64EZ002 | A03 | | TAS61EZ001 | A03 | | TAS61EZ002 | A03 | | TAS62EZ001 | A03 | | TAS62EZ002 | A03 | | TAS63EZ001 | A03 | | TAS63EZ002 | A03 | | |
| Reply 111 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** Ingiven interlocks the operator command is named "Remove ban" | |
| DECISION No 111 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment is accepted. It will be added in the algorithms | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 112 | FSAR: 7  **FSAR Appendix D** |
| **Recommendation:** In some of the algorithms in page Nos. 7.D.259 up to 7.D.303 of Book5 of the FSAR some command signal refer to TA sensors, whereas these sensors do not exist in tables of instrument list (page 7-A-258 to 7.A.275) and in P & ID diagram(page No. 7.A.258). These sensors are listed in the following table:   |  |  |  | | --- | --- | --- | | **TA Sensors** | **YD Algorithms** | **Page No. of Algorithm** | | TA61P002C | YDR10EY002 | 7. D-260 | | TA62P001C | YDR20EY002 | 7. D-264 | | TA63P001C | YDR30EY002 | 7. D-268 | | TA64P002C | YDR40EY002 | 7. D-272 | | |
| Reply 112 | FSAR: 7  **FSAR Appendix D** |
| **Reply:** Check points and algorithms correspond to the design. Sensor "С" is not used | |
| DECISION No 112 | FSAR: 7  **FSAR Appendix D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** P&ID and the list of instruments shall be corrected in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 116 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** In page 7.A-281 to 7.A-294 some set points exist but the  related Algorithms do not exist. For example, in page 7.A-282, for set points "<5.1, <5.29, <5.59, >6.66" there is not any algorithm | |
| Reply 116 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** The comment is not clear, as in given pages the functional diagrams are presented | |
| DECISION No 116 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 117 | FSAR: 7  **FSAR Appendix A and D** |
| **Recommendation:** The following Algorithms which are mentioned in pages 7.A.282- to 7.A-294 Book2, FSAR chapter7, do not exist in "Algorithms  of protections and interlocks main steam pipe line system RA" page 7.D-104 to page 7.D-164 from FSAR Book5   |  |  | | --- | --- | | **Algorithm No.** | **Algorithm No.** | | RAS10EE001 | RAS40EE001 | | RAS10EE002 | RAS40EE002 | | RAS10EE003 | RAS40EE003 | | RAS10EE004 | RAS40EE004 | | RAS10EE005 | RAS40EE005 | | RAS10EE006 | RAS40EE006 | | RAS20EE001 | RAS30EE003 | | RAS20EE002 | RAS30EE004 | | RAS20EE003 | RAS30EE005 | | RAS20EE004 | RAS30EE006 | | RAS20EE005 | RAS20EE006 | | |
| Reply 117 | FSAR: 7  **FSAR Appendix A and D** |
| **Reply:** See algorithms of protections and interlocks. Main steam pipe line system RA. Building ZA/B. 28.BU. 1 ZB.RA.AT.RDR001. Revision 1.  Draw your attention, that algorithms may be corrected due to the change of the manufacturing plant of the “steam unit” valves | |
| DECISION No 117 | FSAR: 7  **FSAR Appendix A and D** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 118 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** In page 10-3-5 of FSAR, chapter 10 the following sensors exist, whereas these are not mentioned in page 7-A-280, to 7.A-294 Book 2 of FSAR.   |  |  | | --- | --- | | **Algorithm No.** | **Algorithm No.** | | 11RA10R005 | 12RA20R001 | | 10RA10R003 | 10RA20R003 | | 10RA10R004 | 10RA20R004 | | 12RA10R006 | 12RA20R002 | | 11RA10R001 | 11RA20R005 | | 11RA10R002 | 12RA20R006 | | 10RA30R003 | 10RA40R003 | | 13RA30R006 | 13RA40R006 | | 14RA30R005 | 14RA40R005 | | 10RA30R004 | 10RA40R004 | | 13RA30R001 | 14RA40R001 | | 13RA30R002 | 14RA40R002 | | |
| Reply 118 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** See section 10.3.3 of FSAR Chapter10 | |
| DECISION No 118 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 119 | FSAR: 7  **FSAR Appendix A** |
| **Recommendation:** P&I Diagram for "RA system in ZB.9 Building" in sheet 7.A.280, Book 2 FSAR is different from the P & I diagram of sheet 10-3-5 chapter 10 of FSAR | |
| Reply 119 | FSAR: 7  **FSAR Appendix A** |
| **Reply:** Due to change of the manufacturing plant of the “steam unit” valves, the RA system diagram in the ZB.9 building will be corrected in the FSAR Chapter 10 | |
| DECISION No 119 | FSAR: 7  **FSAR Appendix A** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Updated drawings and algorithms will be submitted in Appendices A,B,C, and D to chapter 7 of the FSAR, Rev.1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

**Comments on Appendix B3 (to MoM to FSAR-7 (Rev. 0) dated 03-13.03.07, Tehran, LIST OF REPLIES TO OCE LETTER No. LTR-13070-65287 DATED 18.02.06)**

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 2 | FSAR: 7  **FSAR Section 7.1.1** |
| **Recommendation:** Protection on local power is not acceptable. It shall be reconsidered. Even it looks that this is not considered in design e.g. for accident analysis in chapter 15 that there is no case with trip on local power. And also since protection on DNB is considered it do not seem necessary. Generally justification is required with respect to the precision and sensitivity and reliability of measurement with in core neutron detectors… being applied for Protection on local power. In addition it shall be assessed, if it could cause scram when it is not required. e.g. what will be the condition in transients such as condition with change of xenon concentration and distribution?  Table 7.2-2 should be corrected accordingly | |
| Reply 2 | FSAR: 7  **FSAR Section 7.1.1** |
| **Reply: No Reply** | |
| DECISION No 2 | FSAR: 7  **FSAR Section 7.1.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Substantiation of this protection necessity shall be discussed with Gidropress during FSAR-15 consideration | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **FSAR Section 7.1.1 does not demonstrate that the results of the above-mentioned discussion have been considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 3 | FSAR: 7  **FSAR Section 7.1.1** |
| **Recommendation:** Clear information shall be provided on safety classification MCDS and its sub system and their boundaries. In this regard each safety function controlled or monitored by MCDS shall be justified. e.g.   * + protection on DNB   + protection on local power   + LBB monitoring   + etc. | |
| Reply 3 | FSAR: 7  **FSAR Section 7.1.1** |
| **Reply:** Safety classification of MCDS and its subsystems according to PNAE G-01-011-97, given in FSAR text and MCDS structural diagram (Figure. 7.7-7), will be additionally presented in Table:  Table 7.7-7 - Safety classification of MCDS and its subsystems   |  |  | | --- | --- | | Safety classification of MCDS and its subsystems | Classification designation as per PNAE G-01-011-97 | | SHC-P | 2C | | SHC-IC | 3N | | CC UL | 3N | | ICND SHC | 4 | | LMS SHC (ALMS SHC, HLMS SHC) | 3N | | VMS SHC | 4 | | LPMS SHC | 4 | | SIA SHC | 3N | | LL-CS SHC | 4 | | COC | 3N | | Terminals cabinet | 3N |   Safety classification of MCDS and its subsystems, given in Table 7.7-7, is justified in the text of section 7.7.1.4 FSAR. | |
| DECISION No 3 | FSAR: 7  **FSAR Section 7.1.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply is accepted. The classification of ICND SHC (4) and SIA SHC (3N) shall be refined and English abbreviations shall be provided in Table 7.7-7.  The SHC-P is for protection on DNB and local power | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 22 | FSAR: 7  **FSAR Section 7.1.1** |
| **Recommendation:** Table 7.1.1-7 page7-31; relevant information on references for each item concerning relevant experiences and results, should be given | |
| Reply 22 | FSAR: 7  **FSAR Section 7.1.1** |
| **Reply:** Comments are not accepted.  The mentioned information could have been requested on stages of approval of TA, technical design and PSAR. After all the complexes have been manufactured, accepted by NPPD and NNSD representatives, supplied and installed at BNPP, a. m. comments look at least incorrect. Besides, Guide 1-70 contains clear-cut information on additional data to be included into FSAR as against PSAR. Please, be strictly adherent to requirements set forth in Guide 1-70 | |
| DECISION No 22 | FSAR: 7  **FSAR Section 7.1.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** A reference to the number of years (e.g. 2-3 years) and the name of the plant will be provided. It will be considered in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 23 | FSAR: 7  **FSAR Section 7.1.1** |
| **Recommendation:** Page7-24; information on complex “Gindukush-M” should be presented and relevant experiences feedback and upgraded feature should be explained. | |
| Reply 23 | FSAR: 7  **FSAR Section 7.1.1** |
| **Reply:** Comments are not accepted.  The mentioned information could have been requested on stages of approval of TA, technical design and PSAR. After all the complexes have been manufactured, accepted by NPPD and NNSD representatives, supplied and installed at BNPP, a. m. comments look at least incorrect. Besides, Guide 1-70 contains clear-cut information on additional data to be included into FSAR as against PSAR. Please, be strictly adherent to requirements set forth in Guide 1-70 | |
| DECISION No 23 | FSAR: 7  **FSAR Section 7.1.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** Gindukush-M is the information part of SHC-P, SHC-IC, SHC-UL (see Table 7.1.1-7) | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not accepted, a reference to the respective document is given (see above)**. | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 29 | FSAR: 7  **FSAR Section 7.2** |
| **Recommendation:** The first row in table7.2-2 related to FSAR sections shall be deleted. This method for referring is not correct. And the sections referred are not exact ones | |
| Reply 29 | FSAR: 7  **FSAR Section 7.2** |
| **Reply:** Upper line was added to Table 7.2-2 upon request of IAEA experts and NPPD specialists | |
| DECISION No 29 | FSAR: 7  **FSAR Section 7.2** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The line will be deleted from the Table in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 31 | FSAR: 7  **FSAR Section 7.1.1 (item 7.1.1.7 last paragraph)** |
| **Recommendation:** Page 7-32: Generally the scope and purpose of the test in each stage is not clear. The scope and purpose of the test, specially integrated tests shall be given | |
| Reply 31 | FSAR: 7  **FSAR Section 7.1.1 (item 7.1.1.7 last paragraph)** |
| **Reply:** Comments are not accepted.  The mentioned information could have been requested on stages of approval of TA, technical design and PSAR. After all the complexes have been manufactured, accepted by NPPD and NNSD representatives, supplied and installed at BNPP, a. m. comments look at least incorrect. Besides, Guide 1-70 contains clear-cut information on additional data to be included into FSAR as against PSAR. Please, be strictly adherent to requirements set forth in Guide 1-70 | |
| DECISION No 31 | FSAR: 7  **FSAR Section 7.1.1 (item 7.1.1.7 last paragraph)** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** More detail information is provided in the individual test programs | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not accepted, a reference to the respective document is given (see above)**. | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 32 | FSAR: 7  **FSAR Section 7.1.1** |
| **Recommendation:** Page 7-32 Item 7.1.1.8 paragraph 4: engineered safety features activation or removal from services through TLS-U that is in class 3 is not acceptable. Justification is required | |
| Reply 32 | FSAR: 7  **FSAR Section 7.1.1** |
| **Reply:** Comments are not accepted.  The mentioned information could have been requested on stages of approval of TA, technical design and PSAR. After all the complexes have been manufactured, accepted by NPPD and NNSD representatives, supplied and installed at BNPP, a. m. comments look at least incorrect. Besides, Guide 1-70 contains clear-cut information on additional data to be included into FSAR as against PSAR. Please, be strictly adherent to requirements set forth in Guide 1-70 | |
| DECISION No 32 | FSAR: 7  **FSAR Section 7.1.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** in FSAR Rev. 1 in item 7.1.1.8 (2nd para), the following will be corrected:  "engineered safety feature" will be change to "process protection" | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 33 | FSAR: 7  **FSAR Section 7.2.1** |
| **Recommendation:** Usage of abbreviation as it is applied is not appropriate. For example TTT (thermoelectric temperature transducer) and CDC TTT, E-CPS which are used in page 7-51 in fig 7.2-1 in table 7.2-4… are not in abbreviation list. It is better in the fig and in title of table and in the text for the first time its complete name be given. The same for all other cases | |
| Reply 33 | FSAR: 7  **FSAR Section 7.2.1** |
| **Reply:** We suggest supplementing the list of abbreviations with the following:  CDC TTT ‑ Compensation device of connection of TTT  TTT - Thermoelectric temperature transducer  E-CPS ‑ Equipment of control and protection system  SC ‑ Shielded cable | |
| DECISION No 33 | FSAR: 7  **FSAR Section 7.2.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply will be introduced in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 34 | FSAR: 7  **FSAR Section 7.2.1** |
| **Recommendation:** Reliability indices given in page 7-90 are based on calculation which do not seems to be predictive as actual Reliability indices. It is required actual Reliability indices related to any operational experience also be given | |
| Reply 34 | FSAR: 7  **FSAR Section 7.2.1** |
| **Reply:** The reply to the given comment is presented in Reply 2.11 of PSAR Supplement No.1.  Item 7.2.1.6 FSAR shall be supplemented with the following text:  "On the basis of calculations given in PSA (18.BU.1 0.0.00.VAB.PR) probability of failure of EP electric part to actuate by demand is 6,7х10-8.  On the basis of calculations given in PSA (18.BU.1 0.0.00.VAB.PR) the maximum value of probability of failure within one safety channel is less than, than 1х10-4 per one demand".  The calculations were performed on the basis of statistical data on reliability of accessories, obtained by the results of tests and operation experience | |
| DECISION No 34 | FSAR: 7  **FSAR Section 7.2.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The reply will be introduced in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 40 | FSAR: 7  **FSAR Section 7.3.1** |
| **Recommendation:** Page 7-114 the method for recognition non-reliable measurements is not mentioned | |
| Reply 40 | FSAR: 7  **FSAR Section 7.3.1** |
| **Reply:** line 2 shall read: "- non-reliability of measurements (signal from sensor < 4 mА or >20 mА)" | |
| DECISION No 40 | FSAR: 7  **FSAR Section 7.3.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the reply | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 43 | FSAR: 7  **FSAR Section 7.3.1** |
| **Recommendation:** Page 7-117 items 7.3.1.3.1and 7.3.1.3.2   * + The statement "An initial event concurrency with loss of power, external effects (shock wave, aircraft crash, seismic effects) have been considered in Chapter 3 of the PSAR". Is not correct.   + The same for statement "Calculated parameter operational limits under any operating conditions and the margins between each operating mode and the level considered typical for emergency conditions onset are presented in Chapter 16 of the PSAR" | |
| Reply 43 | FSAR: 7  **FSAR Section 7.3.1** |
| **Reply:** Item 7.3.1.3.2: substitute "Chapter 17" for "Chapter 16" | |
| DECISION No 43 | FSAR: 7  **FSAR Section 7.3.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The FSAR Rev. 1 shall be revised according to the following:   * the first bullet will be deleted from the text; * the second bullet (item 7.3.1.3.2) shall be revised; | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 50 | FSAR: 7  **FSAR Section 7.4.1** |
| **Recommendation:** Page 7-131in Table 7.4-1: Table shall be corrected.   * + Under de-energization condition the TA, RR, UD systems are not available. In case that connection to the common DG is considered in Table 7.4-1, it shall be taken into account that automatic loading to the common DG is not acceptable because it is not DB for a.m. system and possibility of loading these systems to common DG is considered for BDBA. Issue shall be discussed in the meeting.   + In addition in this table it shall clearly be defined that for operability of each system what other system shall also be operable. For example for operability TA system TB, TN, TD, RQ, TC and TF are required.   + Required Support system also shall be mentioned such as ventilation system. Table 7.4-2 in Page 7-132 is not prepared for all condition as are in Table 7.4-1.   + UJ shall be changed to VJ   + UE shall be changed to VE | |
| Reply 50 | FSAR: 7  **FSAR Section 7.4.1** |
| **Reply:** Table 7.4-1: substitute VJ and VE for UJ and UE. Other issues are to be discussed at the meeting | |
| DECISION No 50 | FSAR: 7  **FSAR Section 7.4.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:**   * 1st & 2nd bullet: The Table 7.4-1will be checked by the Contractor according to the comment and FSAR Rev. 1 will be corrected, if required**.** * 3rd – 5th bullets:the comment is discussed and reply is accepted | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 53 | FSAR: 7  **FSAR Section 7.5** |
| **Recommendation:** Page 7-156 statement "All instrumentation located on safety panels of MCR and ECR (MCR-SP, ECR-SP) are related to class 2 **;**the rest instrumentation, described in the given section are of class 3" do not seems to be correct because there are other safety class 2 instrumentation that are on main panel and are safety class 2 | |
| Reply 53 | FSAR: 7  **FSAR Section 7.5** |
| **Reply:** In the last paragraph of item 7.5, substitute "indicating instrumentation" for "instrumentation" | |
| DECISION No 53 | FSAR: 7  **FSAR Section 7.5** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** The comment was discussed and paragraph before item 7.5.1 will be expanded in FSAR Rev. 1 | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 54 | FSAR: 7  **FSAR Section 7.5.1** |
| **Recommendation:** Table 7.5.1.1-1 List of safety systems, should be completed other system or element such as level monitors in RPV, containment sump. Containment isolation valves and locks, hydrogen concentration monitor should be mentioned. All instrumentation for radiation and pressure monitor are not mentioned. And also in the first row of table TH 15,25,35,45 pumps shall be deleted and fuel pool cooling system shall be added. TL10 shall be included to the table. Ventilation systems of the rooms MCR, ECR, DG rooms (ZX, ZK1 and ZK2) and pump house (ZM 4, 5) shall also be included to the table. Wide range core exit temperature up to 1200 C (if it is not on console), indications related to fuel pool temperature are not mentioned (important parameter and signalling may be given in a separate table). In addition indicators for Seismic intensity and pressurizer safety valves position are among class two and are not mentioned.  In addition, related to the issue of applying LBB it is required relevant indication be added to safety panel | |
| Reply 54 | FSAR: 7  **FSAR Section 7.5.1** |
| **Reply:** Table 7.5.1.1-1 contains the list of safety systems located on MCR/SCR panels. System you offer cannot be included into a. m. Table. For instance, ventilation in ZM4,5 Building is arranged in LCPs located in the same buildings | |
| DECISION No 54 | FSAR: 7  **FSAR Section 7.5.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** In FSAR Rev. 1 the Table 7.5.1.1-1 will be revised for the following, if required:   * TL-10; * Ventilation of ZX; * UF 40-70; | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

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| **AEOI** | **NUCLEAR POWER PLANT “BUSHEHR”  POWER UNIT 1  FSAR ANALYSIS** |
| ISSUE No. 56 | FSAR: 7  **FSAR Section 7.5.1** |
| **Recommendation:** Page 7-161: statement "Coincidence of such events as severe design-basis accident and aircraft crash is not considered in the design" is not related to the rest of the text. It needs more explanation | |
| Reply 56 | FSAR: 7  **FSAR Section 7.5.1** |
| **Reply:** Item 5.1.3, paragraph 2, reads that incomplete information on post-accident monitoring is displayed on SCR (which is not the case with MCR). For this reason, coincidence of accident and MCR destruction is not considered | |
| DECISION No 56 | FSAR: 7  **FSAR Section 7.5.1** |
| DECISION ON UPDATE OF FSAR CHAPTER 7 ON RESULTS OF DISCUSSIONS OF NPPD COMMENTS AND CONTRACTOR’S REPLIES:  **Agreement:** 2nd para of Item 5.1.3, will be deleted | |
| **EXPERT CONCLUSION ON CORRECTNESS OF CONSIDERATION OF THIS COMMENT IN CHAPTER 7 FSAR REVISION 2**  **The comment is not considered.** | |

# 3. Findings and recommendations

3.1. The information presented in Chapter 7 (revision 2) of the Final Safety Analysis Report in general corresponds to the structure of Guide 1.70.

3.2. The necessary scope of additional information, recommendations for correction of the considered document are reflected in the present expert review report.

This also refers, inter alia, to the issues of confirming the reliable functioning and operation of the Power Unit without violation of safe operation limits and conditions with account of influence on safety of external effecting factors, including operator’s erroneous actions.

3.3 In experts’ opinion, prior to obtaining the BNPP-1 Commercial Operation License, the presented Chapter 7 of the FSAR requires a serious update to confirm observance of safe operation limits and conditions (a more complete analysis of substantiation of design compliance with general design criteria and safety criteria), comprehensive analysis of potential interference of an operator till expiration of temporary ban after actuation of safety systems, full observance of the requirements of regulatory documents and other substantiating documents (including documentation of supplier-manufacturers), and also with account of the comments stated in the present report.

3.4 Additional materials and modifications reflected in Addendum 1 to the PSAR have not been included to Chapter 7 of the FSAR, which resulted in degradation of individual FSAR sections as compared to the PSAR.

3.5 Chapter 7 of the FSAR does not reflect modifications introduced to the APCS design after issuance of the FSAR, neither has it given the results of performed acceptance tests of the Power Unit APCS subsystems and of software-and-hardware complexes.

3.6 Chapter 7 of the FSAR does not contain information and analysis proper on radiation monitoring and “black box” subsystems.

3.7 The final conclusion on sufficiency of safety substantiation of APCS tools and systems can be made on the results of discussing the comments and recommendations with the document developers and analysis of updated materials.

The document developers are recommended to:

* consider recommendations of the present expert review report when updating Chapter 7 of the FSAR;
* notify regulatory authorities of the activity aimed at rectification of the above-listed comments.

# References

## i. List of documents considered during review

1. Chapter 7 “Instrumentation and control systems (I&C)” of the document “Final Safety Analysis Report. Power Unit No.1. “Bushehr” NPP 49.BU.1 0.0.ОО.FSAR.RDR001 (revision 2, issue December 2014).
2. Minutes of discussion results of the comments made during review of Chapter 7 "Instrumentation and control systems (I&C)” of the FSAR, revision 0, with the decisions made on every comment.
3. Technical decisions taken on the results of the Power Unit commissioning.

## Ii. List of documents, which requirements have been selected as expert assessment criteria

1. PNAE G-1-011-97 (OPB-88/97). General provisions of NPP safety assurance, section 5.2.6.
2. PNAE G-1-024-90 (PBYa RU AS-89). Nuclear safety regulations for NPP plants.
3. PBYa 04-74. Nuclear safety regulations for NPPs, section 4 with Amendment No. 1.
4. NP-026-04. Requirements to control systems important for NPP safety.
5. STO 1.1.1.01.0678-2007. Main regulations of NPP operation assurance (OPE-AS), 4th edition.
6. RD 210.006-90. Regulations for NPP process design.
7. 50-S-O. NPP safety - operation, commissioning and decommissioning of NPP. A Code of Practice. Vienna, 1979. Volume 3.
8. 50-SG-D8. Instrumentation and control systems important to safety in nuclear power plants. 1984.
9. 50-SG-O3. Operational limits and conditions for nuclear power plants. 1980.
10. US NRC Regulatory Guide 1.70. Standard Format and Content of Safety Analysis Report of Nuclear Power Plants. 1978.
11. NUREG-0800. Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants LWR Edition. April 1996.