R1.03/96E. Computer Information System

Nuclear power plant	Kalinin NPP, Russian Federation
Project reference	R1.03/96E
Project name	Computer Information System
IAEA safety issue	I&C 1 I&C Reliability
Safety rank	II
Additional IAEA safety issue	I&C 4 – Human engineering of control room
Safety rank	II
Budget year	1996
Work order	01/10/98
Contract amount, Euro	2.5 M€
Contract status	Completed
EC signature of the contract	11/07/02
Supplier	Data Systems & Solutions
Current status of the project	Completed
Provisional acceptance certificate	08.12.2004
Final acceptance certificate	Expected in the end of 2006

1. Initial situation and project safety significance

Before the project the design of the information display in the control room of Kalinin NPP did not give the operator a rapid overview of information regarding the current state of plant and reactor safety as a whole. I&C equipment was obsolete. The safety parameter display system (SPDS) did not correspond to the current technical achievements in NPP safety and required improvements.

Two safety issues identified by IAEA issue books had to be resolved, namely I&C 1 – IC reliability and I&C 4 – Human engineering of control room, in which point 3 required addition of a Safety Parameter Display System. Both these issues were of rank II.

Former TACIS 91/4.2 1 and 93/R2.03 projects (respectively Safety panel (SP) Mock up and SP prototype) paved the way for implementation of operational SP in Kalinin NPP Unit 2. The review with the end user about the integration of DSP with the other I&C systems of the plant, especially with the existing Computerized Information System CIS showed that great advantage could be gained by combining SP with an upgrade of actual CIS.

The project was requested by the NPP because the existing system was obsolete, monitors were old, computers were old (SM2) and had to be replaced by newer models. It was necessary to do this job, but the time was difficult from the financial point of view and TACIS was the only means of getting the necessary money. At the same time TACIS offered access to the contemporary achievements of the EU in computer development. Initially, the plant conducted talks with the company Foxborough from the US, but in view of the lack of financing the talks were stopped. Since TACIS gave its approval, the project was scheduled to be done in TACIS OSA programme.

Goal: This project was aimed to enhance the quality of information available in the Control Room (both in normal and incidental/accidental situations) and to provide the necessary information to the local crisis centre and the centralized crisis centre in Moscow.

2. History of implementation

Financial aspects

The project was very much needed. However, the amount of money needed was large, and had to be collected by uniting several projects. The initial estimate of the amount of money needed was made by the Consultant, who had asked the local Russian organization KONSIST to make the preparatory work and feasibility study. Knowing the number of input signals and their character, it was possible to evaluate the costs, which were found to be about 2.8 mln €. It should be stressed that the Consultant made it a rule to use local Russian organizations for preparatory work for various projects. This resulted in getting realistic estimates of the money necessary and the time needed for the implementation of the projects.

In view of the shortage of money assigned initially for the project, the plant asked to divert the funds from two other projects, namely R1.03/95D and R2.01/95. REA supported the request of the plant and the EC showed elasticity and understand ding of the plant needs and approved the changes in the budget. Thus from the first Work Order (WO) issued in 1998 for the amount of 1 mln €, after 3 years of work it was possible to get EC approval for the 96E project at the price of 2.5 mln €. The Russian side provided the necessary expenses for its part of the work, namely for system mounting.

Project description

Signal acquisition and pre-processing part of the existing CIS was to be maintained and only a restricted number of new signals was to be considered for acquisition by a new complementary system.

Pertinent documents that had been produced under other TACIS projects, (Rovno CIS and South Ukraine CIS) constituted a good working basis for the development of the specifications for Kalinin CIS.

In Safety Panel (SP) implementation:

- The SP functional analysis could be partly reused, as validated by the SP prototype projects,
- The emergency procedures for Kalinin NPP being under development at the time of project start and their impact on SP prototype functionalities had to be evaluated,
- The database including signals, displays, algorithms that had been build up and validated in the frame of SP prototype could also be reused. .

Thus the R 1.03/96E project was devoted to

- Tendering and procurement of CI/SP system,
- Implementation of the system in the plant, its validation and acceptance by the Russian Safety authorities.

The acceptance of the system by GAN was planned on the basis of “good practice” requirements, as the system was classified as class C system of IEC 1226 and 4N according to the Russian OPB-88.

Implementation

Once the financing was assured the implementation of the project was successful.

Since the project was considered to be safety class 4N, after the initial review by Riskaudit and GAN it was decided that no further GAN approvals are necessary. Nevertheless, GAN representative was present during FAT.

The TS specified that the cables should remain in the same positions, so no changes in the layout of the system were planned.

The initial meeting of the potential suppliers before the tender in the NPP lasted 1 day, and all could ask any questions they needed. However, more detailed consideration of the list of documents to be submitted by the plant was done later, before the signing of the contract, when DSS had been already chosen as the winner. This meeting took place in February 2002, while the signing of the contract took place in July 2002. In addition to putting the full list of available drawings into the TS, the plant discussed this list in detail with the DSS. Other problems were also clarified.

The consultant helped to organize a trip of 5 NPP experts (+ 1 consultant) to Lithuania, where an installation was built with the participation of BIS, the Lithuanian subcontractor. It was done in April 2002, so before the contract was signed. The manager of DSS for this project was a highly competent Russian engineer whose knowledge of the language and people was very helpful. This was the first job of DSS in RF and the company was eager to do a good job.

DSS organized the work well. GAN and Riskaudit were invited to the first meeting. TS were evaluated within 2+2 approach efficiently and with positive results.

During the project implementation, people from the company BIS (Lithuania) which was a subcontractor worked efficiently.

No big difficulties occurred once the order from REA was signed. Regular project meetings were held with all stakeholders.

Present status

The project is completed. The equipment was supplied in December 2004, tested and commissioned in June 2005 (Lot 2). The separate shortcomings have been removed by DSS within 2005- first half of 2006. Warranty period runs for 2 years from PAC date which was 08.12.2004

The NPP enjoys excellent support from the subcontractor, telephone or e-mail advice is always available, workers from Unit 3 quote the system built in Unit 2 as the best example of successful work.

Achieved results

CIS gives the operator a clear overview of the current state of the plant. Safety Panel Display System provides operator with sufficient information to control safety functions during accident.

Excellent opinions of NPP on the project

Both the equipment and the organisation of work were excellent. The necessary work was reviewed and well prepared before plant shutdown for maintenance, all work was done during one shutdown, without delaying plant restart.

3. Licensing activities within 2+2 approach

TSOs' technical support was provided for Nuclear Licensing Steps NLS 1 and 4. The documentation for the remaining licensing stages was not received in time to be reviewed within the timescale of the Review Project.

The documentation for NLS 1 covered the decision on upgrading of the existing Computerised Information System (CIS) and providing Safety Panels (SPs) at Crisis Centres in the Kalinin NPP, Unit 2, It set down the reasons for the action, how the proposed replacement would meet the safety requirements of the Russian regulator, the overall technical requirements and the evaluation criteria.

The documentation for NLS 4 provided the Technical Specification that Computer Information/Safety Panel (CI/SP) Systems was to meet. Applicable Russian and International Codes and Standards to be applied were identified. The safety category (Safety Category C for the computer information system and 'unclassified' for the Safety Panels) was defined.

4. Safety impact of the project

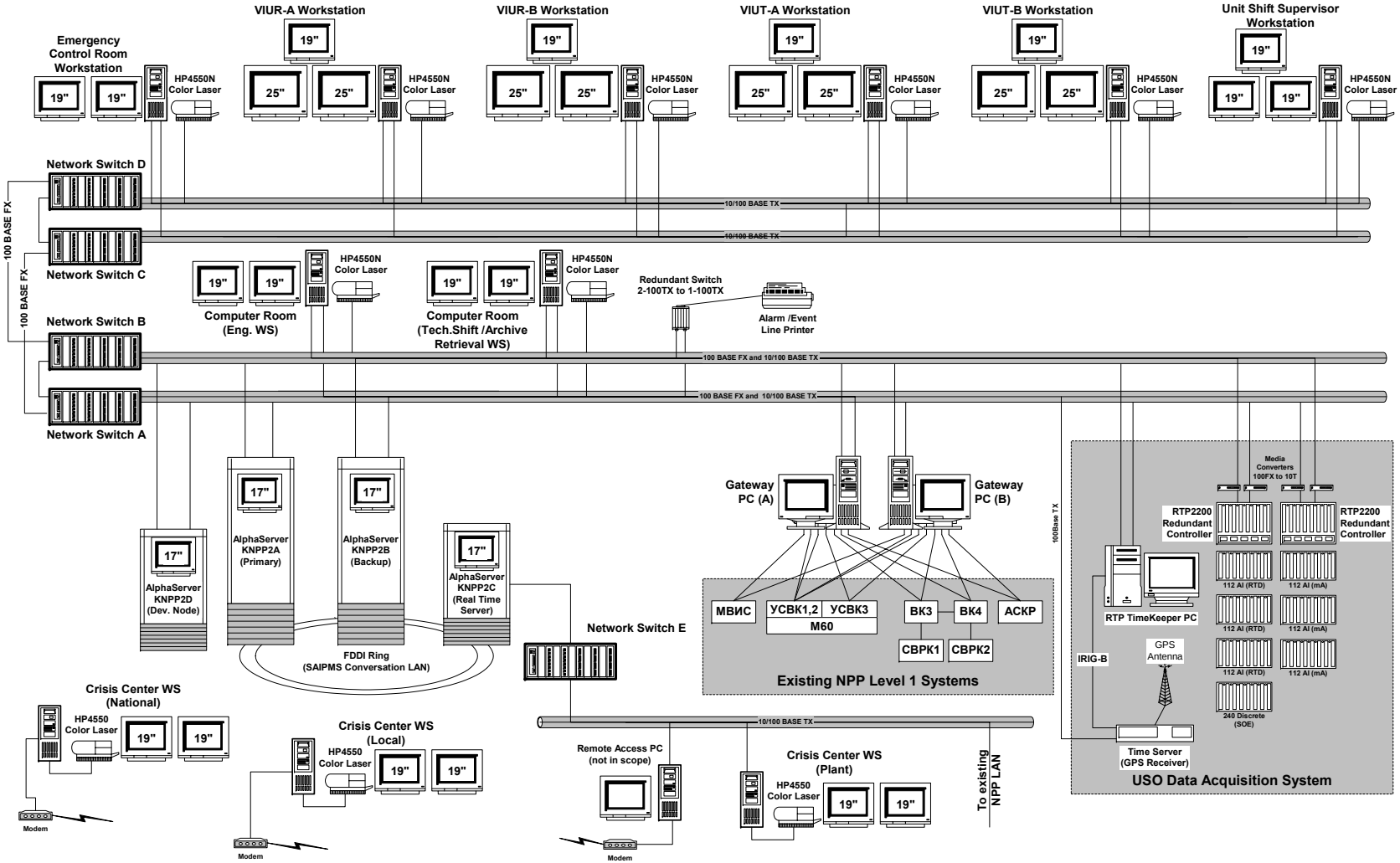
The main safety and operational benefits resulting from upgrading the computer information system:

1. Increase the unit behaviour knowledge through better event discrimination, better event recording and retrieval as well as possibilities for a larger number of data to be acquired from the process;
2. Decrease operator errors by providing modern man-machine interface using enhanced system capabilities;
3. Provide safety benefits in incident and accident conditions;
4. Provide users with data about the unit through the plant local network.

Additionally, the expected safety and operational benefits of introducing Safety Panels at the Crisis Center are:

1. To assist Control Room personnel in the evaluation of the safety status of the plant by providing continuous information under all plant situations;
2. To make the needed information available for the different Crisis Centres located in the plant, locally and nationally.

The TSOs' experts estimated that the above mentioned safety benefits envisaged for normal plant operation as well as under emergency accident conditions can be achieved with the upgraded computer information system.



CIS in Kalinin NPP