RECENT STATUS RSG-GAS AGEING MANAGEMENT

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ABSTRACT

RSG GAS Research Reactor–30 MW, which is the biggest scientific investment made by the Indonesian Government, is operating safely for about 27years. This research reactor has been built and developed since year 1983. Critical attainment reached first on July 1987 and ceremonial opened by president of RI on August 20th 1987. Operated with full energy of 30 MW reached first time on March 1992. It started becoming commercially operated since 1995. RSG-GAS has a maximum thermal energy of 30 MW and has neutron flux of averaged 10^{14} n/cm^2.sec coming from fissile reaction. RSG-GAS is a reactor with pool type with fuel of 19.75% enriched U_3O_8Al/U_3Si_2Al and burned up ratio up to 56%. RSG GAS has been built for scientific purpose by utilizing neutron beam instruments and isotope productions. Facilities allowing Neutron Activation Analysis for research and industry are both on-line. For affording the utilization or the reactor operation approaching the designed life, the progressive ageing management is being applied. This paper will address the ageing management based on the importance to safety and SSC replacement ease consideration, which is implemented on RSG GAS. It consist of minimization of expected ageing prevention which is divided into prevention actions and followed by periodic review of this effectiveness, detection, monitoring and trending of ageing degradation through periodically inspections, and testing. Some activities such as NDT-ultrasonic to mitigating the ageing degradation of secondary water pipe lines, underwater camera for tank liners, infrared thermograph for understanding the cable insulation age, Eddy Current for inspecting the Heat Exchangers, surveillance corrosion for understanding the corrosion mechanism and structure material lifetime by immersing cupons into primary, secondary and raw water basin for many years and some ended by refurbishment-for secondary pump, are being applied. Based on the results, some a class structures must be inspected and scheduled for 2013 by using the NDT method.

Introduction

RSG-GA Siwabessy is a Multi Purpose Research Reactor for Indonesia that has been built and developed since year 1983. Critical attainment reached first on July 1987 and ceremonial opened by president of RI on August 20th 1987. Operated with with full energy of 30 MW reached first time on March 1992. RSG-GAS has a maximum thermal energy of 30 MW and has neutron flux of averaged 10^{14} n/cm^2.sec coming from fissile reaction. RSG-GAS is a reactor with pool type with fuel of 19.75% enriched U_3O_8Al/U_3Si_2Al. It is located at Serpong Nuclear area in the heart of science and Technology Park. It has power of 30 MWt, MTR type reactor.

Since being operated, series of routine and non-routine action for maintaining the integrity of structure material and other installation were done, such as inspecting the Heat Exchanger, tank liner etc. The main objective of this program is to managing ageing of SSCs important to safety at RSG GA Siwabessy research reactors. In this paper, series of ageing management actions will be reported.

Ageing Program in RSG-GA Siwabessy 30 MW

The management system for ageing management provide a framework for managing, performing and assessing the activities necessary to prevent, detect, monitor, assess and mitigate ageing effects of RSG GA Siwabessy. The documentation of the management system for ageing management include descriptions of the organizational structure, functional responsibilities, levels of authority and interactions of those managing, performing and assessing the adequacy of the ageing management activities. It should also cover other management measures, including planning, scheduling, resource allocation and human factors. The management system for ageing management is outlined in a description of the ageing management programmes and be documented in operating procedures. The operating procedures address all applicable requirements specified in the integrated management system established by the operating organization. The scheme organization for RSG-GA Siwabessy is shown in Figure 1.

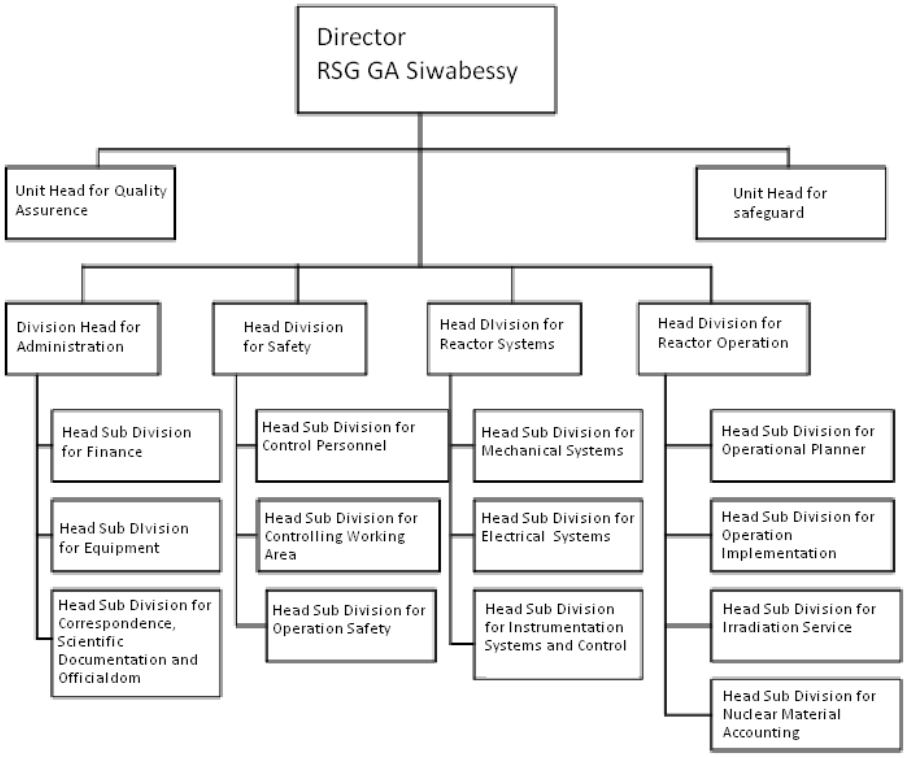

Fig. 1. RSG-GA Siwabessy organization scheme.

The RSG GA Siwabessy is managed by a director who is being supported by three head technical division and one administration division. Where, the quality assurance division is being positioned lowered by the head division but responsible directly to the director. This chart is based on the BATAN's chairman's regulation No. 123/KA/VIII 2007.

The administration division gives service to all for including the publication documentation, budgetary and others. Safety division have a duty on controlling all safety work and reactor research operation such as controlling safety for working area from radiation and non-radiation aspects, controlling the radiation exposure, coordinating the emergency nuclear and do analyses and assessment for reactor research operation, and prepare to all the Safety Analyses Report (SAR).

Reactor Operation Division has a duty on operating the research reactor consist of planning, doing and managing waste, irradiation services and accounting the fuel, managing the fuel and preparing all the documents for licensing.

Reactor System Division has a duty on maintenance and refurbishment , consist of mechanical, process, mechanical workshop and in-service inspection, electric followed by operating the electrical workshop, instrumentation control followed by operating the instrumentation workshop. For covering this entire description job, this division is divided into three sub-division i.e. mechanical Sub Division, Electrical Sub Division, and Instrumentation Control Sub Division.

Mechanical Sub Division has 15 staffs who is divided into two working group (WG), WG I is having duty on System process and WG II on ventilation and water chemistry. Electrical Sub Division has 8 staffs that are distributed in to WG Power Distribution System and Emergency Power. Instrumentation and Control Sub Division has 6 staffs, which is distributed into 3 WG, Process Instrumentation System, Reactor Protection Instrumentation System and Radiation Protection System.

Beside the routine maintenance, the maintenance personnel have a duty also on non-routine maintenance such as fixing the broken component or reactor system that is having trouble. All the activities are being recorded well. These maintenance activities absorb lots of budget which is coming from the government.

Reactor System Division coordinates with two others divisions, Safety and reactor Operation division on maintenance subjects. The coordinating meeting is scheduled as weekly meeting on every Monday morning starts at 8 am. The main topics that should be discussed are system status, what is the problem, and how is the solution practically. Scientifically solution is being delivered to the other center that is managed by the Center for Reactor Technology and Nuclear Safety.

The maintenance implementation is divided into two big projects, routine and non-routine project, which is handled by the Reactor System Division. In general, the implementation consist of managing the human resources, time scheduling, budgeting, stocking up the spare parts and documentation.

Resources Management

RSG-GASiwabessy provide adequate resources (both human resources and financial resources) to execute the ageing management programme. The management of the operating organization, in particular the reactor manager, participates in the ageing management activities by:

(a) Determining the required staff competences and providing training annually for certification as Operator, Supervisor and radiation Supervisor; training on maintenance and safeguard.
(b) Preparing and issuing specifications and procedures for the ageing management programme;
(c) Having frequent personal contact with staff, including observation of work in progress;
(d) Supervising external personnel (including suppliers) who perform ageing management activities, and ensuring that these personnel are adequately trained and qualified;
(e) Supporting and participating in ageing evaluations.

The management system for ageing management include provisions to ensure that the ageing management activities are planned, performed and controlled in a manner that ensures effective communication and clear assignment of responsibility.

Recent Status

The activities that have been done are :

1. Inspection and Refurbishment I&C based on PLC for

a. Cabinet CQA 01 : Primary Cooling Control System
b. Cabinet CQA 02 : KBE 01 and 02 Purification Control System
c. Cabinet CQA 03 : FAK 01 Purification Control System
d. Cabinet CQA 04 : Electric Power Control System
e. Cabinet CQA 05 : Ventilation Control System
f. Cabinet CQA 06 : Radiation Protection Control System
g. Cabinet CQB 01 : Container for Liquid Waste Control System
h. Cabinet CQB 02 : Secondary Cooling Control System
i. Cabinet CQB 03 : Demineralized Water Plant Control System

2. Chimney Reactor Building Monitoring System
3. Alpha /Beta Aerosol Monitoring System
4. Changed some electrical system for:
    a) Switch Gear BHT 01, 02 and 03
    b) Power Distribution Panel BHA, BHB and BHC
    c) Power Supply Not the End (UPS BTP 01 and 03)
    d) Power Supply DC 24V Battere BTJ 11&12, 21&22, 31&32 and BTD 01, 02 and 03
    e) Overhaul Diesel Generator BRV 10, 20 and 30
    f) Geared Motor Blower Cooling Tower (7 unit)
    g) Panel Chiller I and II TC-ISFS
    h) LIFT
    i) ACB DIESEL 3 unit.
    j) Increase the CAPASITOR BANK on Distribution Panel
    k) Changed the Secondary Pump Distribution Module
    l) The addition of Power Booster Pump from Diesel.
    m) Control Panel Replacement System WWL
5. Inspecting by using Thermograph for cables, UPS cabinet, ventilation system.
6. Primary Cooling System:
    a) Measurement of reactor tank liner visually
    b) Changing the 2 (two) coupling primary pumps (2013)
    c) Corrosion Surveillance cupons for primary cooling water (since 2007 up to present)
7. Secondary Cooling System:
    a) Removal scale in the secondary side of primary heat exchanger by using sponge ball (routine)
    b) Removal scale in the secondary side of primary heat exchanger by physically action (non routine)
    c) Cleaning the filter secondary water cooling
    d) Inspecting and mechanical cleaning the Heat Exchanger by using Eddy Current
    e) Measuring the thickness of secondary piping lines by using UT
    f) Changing secondary pumps, 3 pumps
    g) Changing 30% of secondary pipings (2008~)
    h) Changing Chilled Water System
    i) Changing Geared motor blower cooling tower, filter and fan
    j) Changing demineralized water tank
    k) Changing Distribution Panel for ventilation room
    l) Compressed Air Supply System
    m) Refurbishment the outdoor secondary piping lines.
    n) Automatization the chemical injection system
    o) Changing pump for regeneration secondary coolant
    p) Corrosion Surveillance Coupons in both sides of raw water basin and cooling tower basin (2007 up to present)

Future Actions

Some parts need to be inspected neatly and be fixed.

Conclusion

The ageing management for maintaining the SSC is being done continuously in RSG GA Siwabessy from the aspect of electrical, I&C, mechanical and also material. From the visual inspection, it is understood that some parts need to be inspected, evaluated and fixed neatly. Technical and scientifically information from other country is needed for developing our technique on solving the ageing problem.

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