

# Experience of commissioning the AES-2006 (V-392M) steam generator blowdown system

S.V. Yaurov\*, K.F. Galiev, A.V. Borovoy, A.S. Volnov

*“Novovoronezh Nuclear Power Plant,” Branch of JSC “Concern Rosenergoatom”, 1 Promyshlennaya Zona Yuzhnaya, Novovoronezh, Voronezh Reg. 396072, Russia*

Available online 6 December 2017

## Abstract

Structural features of the AES-2006 design (V-392M reactor plant) steam generator blowdown and drainage system have been considered. Design peculiarities of components and the system as the whole have been comprehensively analyzed, and the advantages and disadvantages of the circuitry and design solutions used are presented. An apparent advantage of the system's flowchart is the maximum blowdown rate increased to 140 t/h. At the same time, issues have been identified caused by insufficient elaboration of structural elements.

Based on the earlier experience of the system commissioning, a modified flowchart has been proposed for the steam generator blowdown and drainage using multi-pass valves with an electric single-turn (EST) actuator drive in the system. The flowchart modification makes it possible to reduce the specific content of metal in the system and to provide an extra space for the maintenance of the system's regenerative heat exchanger in a pressurized shell, to use eight multi-pass valves for the steam generators instead of 36 electromagnetic valves, and to cut the operating and repair costs.

Modifications have been proposed to the regenerative heat exchanger design to give it a better performance, including installation of circular partitions in the lower inlet (pressure) and the upper outlet chambers. As the result, this leads to a heat exchanger with three passes in the tube space which helps achieving the required flow rate.

The above updates will improve the performance and reliability of the steam generator blowdown and drainage system as far as its design functions are concerned, this to result in the secondary circuit's water chemistry arranged so that to minimize the amount of deposits on the heat-exchange surface of the PGV-1000MKP steam generators.

Copyright © 2017, National Research Nuclear University MEPhI (Moscow Engineering Physics Institute). Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

*Keywords:* Steam generator; AES-2006; Blowdown; V-392M reactor plant; Operation; Upgrading; Regenerative heat exchanger; Water chemistry.

## Purpose and functions of the steam generator blowdown and drainage system

The steam generator (SG) blowdown and drainage system for the secondary circuit is designed to maintain the secondary circuit's water chemistry [1].

The system is designed to remove dissolved impurities from SGs through the salt compartment (continuous blowdown) and sludge from the shell lower points and the secondary circuit header pockets (periodic blowdown) with the blowdown water fed to reactor water treatment system 5 (RWT-5) and the return of purified water.

Besides, the SG blowdown and drainage system perform the following functions [2,3]:

- drainage of the filled up steam generator for the secondary circuit through the blowdown and drainage pipelines with a flow rate of not less than 20 t/h at a pressure of 0.098 MPa and the blowdown (boiler) water temperature of 20–85 °C;

\* Corresponding author.

*E-mail addresses:* [YaurovSV@nvnp1.rosenergoatom.ru](mailto:YaurovSV@nvnp1.rosenergoatom.ru) (S.V. Yaurov), [GalievKF@nvnp1.rosenergoatom.ru](mailto:GalievKF@nvnp1.rosenergoatom.ru) (K.F. Galiev), [BorovoyAV@nvnp1.rosenergoatom.ru](mailto:BorovoyAV@nvnp1.rosenergoatom.ru) (A.V. Borovoy), [VolnovAS@nvnp1.rosenergoatom.ru](mailto:VolnovAS@nvnp1.rosenergoatom.ru) (A.S. Volnov).

Peer-review under responsibility of National Research Nuclear University MEPhI (Moscow Engineering Physics Institute).

Russian text published: *Izvestiya vuzov. Yadernaya Energetika* (ISSN 0204-3327), 2017, n.3, pp. 151–161.

<https://doi.org/10.1016/j.nucet.2017.11.009>

2452-3038/Copyright © 2017, National Research Nuclear University MEPhI (Moscow Engineering Physics Institute). Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license. (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

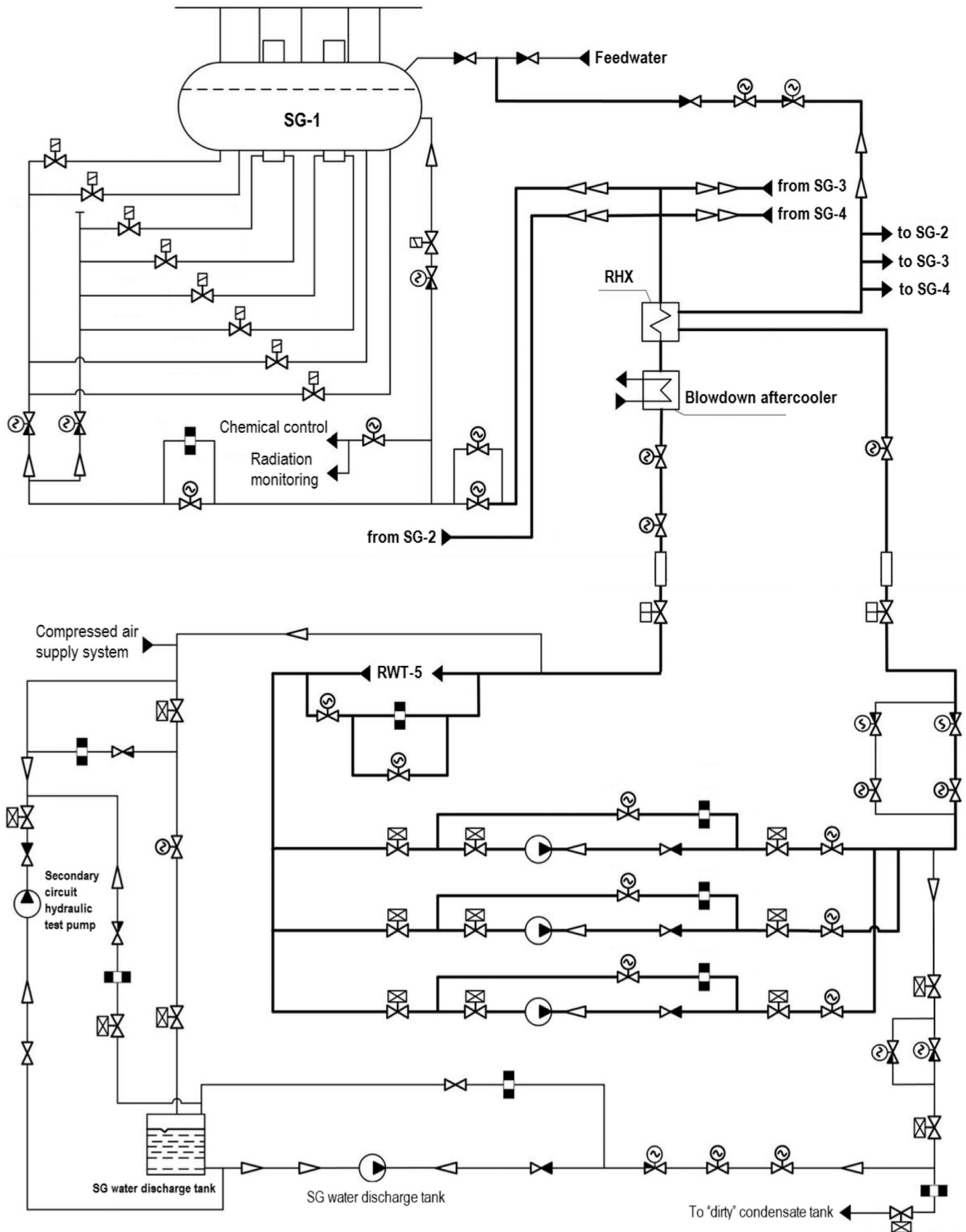


Fig.1. Flowchart of the SG blowdown and drainage system used in AES-2006.

Download English Version:

<https://daneshyari.com/en/article/6846055>

Download Persian Version:

<https://daneshyari.com/article/6846055>

[Daneshyari.com](https://daneshyari.com)