GE Nuclear Energy

General Electric Company
175 Curtner Avenue, San Jose, CA 95125

October 13, 1993

Docket No. 52-001

Chet Poslusny, Senior Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of the Nuclear Reactor Regulation

Subject: Submittal Supporting Accelerated ABWR Schedule - **SGTS Discussion Items**

Dear Chet:

Enclosed is a SSAR markup of selected portions of Section6.5 which addresses the discussion items of the GE/NRC Plant Systems Branch conference call on October 13, 1993.

Please provide copies of this transmittal to Jim Lyons and Janak Raval.

Sincerely,

Jack Fox

Jack Fox
Advanced Reactor Programs

cc: Alan Beard (GE)
Norman Fletcher (DOE)
Chandra Oza (GE)

JF93-274

9310210302 931013
PDR ADOCK 05200001
A PDR

D050
1/1

the SGTS system is capable of performing its intended function in the event of LOCA. A single train may be manually initiated for surveillance testing.

6.5.1.2.3.3 Decay Heat Removal

Cooling of the SGTS filters may be required to prevent the gradual accumulation of decay heat in the charcoal. This heat is generated by the decay of radioactive iodine adsorbed on the SGTS charcoal. The charcoal is typically cooled by the air from the process fan.

A water deluge capability is also provided, but primarily for fire protection, since redundant process fans are provided for air cooling. Since the deluge is available, it may also be used to remove decay heat for sequences outside the normal design basis. Temperature instrumentation is provided for control of the SGTS process and space electric heaters. This instrumentation may also be used by the operator to [re-]establish a cooling air flow post-accident, if required.

Water is supplied from the fire protection system and is connected to the SGTS via a spool piece.

6.5.1.3 Design Evaluation

All surrounding areas/buildings are at atmospheric pressure.

6.5.1.3.1 General

(1) A negative pressure of 6.35 mm water gauge is normally maintained in the secondary containment by the Reactor Building HVAC System (Subsection 9.4.5). On SGTS initiation (Subsection 6.5.1.2.3.1), the secondary containment HVAC is automatically isolated.

(2) The SGTS filter particulate and charcoal efficiencies are outlined in Table 6.5-1. Dose analyses of events requiring SGTS operation (Subsections 15.6.5 and 15.7.4) indicate that offsite doses are within the limits established by 10CFR100.

(3) The SGTS is designated as an engineered safety feature (ESF) since it mitigates the consequences of a postulated accident by controlling and reducing the release of radioactivity to the environment. The SGTS, except for the deluge, is designed and built to the requirements for Safety Class 3 equipment as defined in Section 3.2, and 10CFR50, Appendix B.

The SGTS has independent, redundant active trains. The two SGTS trains are mechanically and electrically separated. They are located in two side by side compartments (separated by rated fire barriers) adjacent to the HVAC system exhaust. Should any active train fail, SGTS functions can be performed by the

IE Bulletin No. 80-03 (issued on February 6,1980) concerns the potential loss of charcoal from adsorber cells due to wide spacing between the rivets which secure the screen to the casing. The ABWR design does not use rivets. Instead the design utilizes a welded design construction which would prevent of any loss of charcoal.

calculation. Reasonable scrubbing factors of just 10 for elemental and particulate iodine results in only 45 kg of charcoal being required versus the nominal 794 kg provided. This margin between the charcoal realistically required and that needed per the design basis provides additional protection against any aging or weathering that may occur. The retention of iodine in the suppression pool is discussed in NUREG-0772 and NUREG-1169, which established the basis for the ABWR design under Paragraph 8.9 of the Licensing Review Basis. (Reference 1)

Insert

(5) Because of the high availability of the ABWR, de-inerting and the potential use of the SGTS during de-inerting will occur primarily at the end of the fuel cycle. In this way, HEPA filter and charcoal adsorber effectiveness will be tested, and the filter and/or charcoal replaced, if necessary, before the plant returns to power operation.

All active SGTS components are redundant. Non-safety space heaters are located both upstream and downstream of the charcoal bed. Divisional power is used for reliable space heater operation.

6.5.1.3.4 Source Terms for SGTS Design

The basis for calculating the iodine source term for the SGTS filters is provided in Table 6.5-2. For the purposes of sizing the SGTS charcoal adsorber, no additional credit for iodine retention or holdup above that specified in Regulatory Guide 1.3 is assumed. Charcoal sizing is discussed in Subsection 6.5.1.3.3(4).

6.5.1.3.5 Compliance with Regulatory Guide 1.52

An assessment of compliance with Section C of Regulatory Guide 1.52, including testing, is provided in Appendix 6A.

6.5.1.3.6 Primary Containment Purging

The SGTS may be used either for a DBA identified in Chapter 15 or during de-inerting of the primary containment prior to plant shutdown. The more likely, though still infrequent, potential use of SGTS is during de-inerting. Depending on indications from Leak Detection and Isolation System (LDS) primary containment radiation monitoring before de-inerting is initiated or from the process radiation monitoring (PRM) Reactor Building ventilation exhaust radiation monitors during de-inerting, SGTS may be placed into service.

If purging (i.e., de-inerting) through the HVAC will [or does] result in a trip from the ventilation exhaust radiation monitors, then de-inerting will be [re-]initiated at a reduced rate through the SGTS. Use of SGTS during de-inerting is expected to be infrequent.

(c) "The system design should provide for permanent test probes with external connections in accordance with the provisions of Section 4.11 of ANSI N509-1976."

The design is in compliance with this position.

(d) "Each ESF atmosphere cleanup train should be operated at least 10 hours per month, with the heaters on (if so equipped), in order to reduce the buildup of moisture on the adsorbers and HEPA filters."

The surveillance test requirements are provided in Technical Specification 3.6.4.3 (Chapter 16). Each space heater, used only during SGTS standby, contains a small circulating fan which serves to maintain the entire filter train at a uniform temperature. The filter train is physically isolated during system standby. Therefore, SGTS operation other than as required for mitigation of offsite dose is not required. The isolation of the filter train also serves to minimize the degradation of the HEPA filters and charcoal adsorber due to weathering effects between surveillance tests. This is further discussed in Subsection 6.5.1.3.3, "Justification for Single SGTS Filter Train."

The design is in compliance with this position.

Insert e

(e) "The cleanup components (i.e., HEPA filters, prefilters, and adsorbers) should not be installed while active construction is still in progress."

Installation of the SGTS will comply with this position.

(5) In-Place Testing Criteria

(a) "A visual inspection of the ESF atmosphere cleanup system and all associated components should be made before each in-place air flow distribution test, DOP test, or activated carbon adsorber section leak test in accordance with the provisions of Section 5 of ANSI N510-1975."

The system test procedures will comply with this position.

(b) "The air flow distribution to the HEPA filters and iodine adsorbers should be tested in place for uniformity initially and after maintenance affecting the flow distribution. No velocity reading shall exeed ±20% of the calculated average. The testing should be conducted in accordance with the provisions of Section 9 of "Industrial Ventilation" and Section 8 of ANSI N510-1975."

Acceptance tests, performed after completion of initial construction and after any system modifications or repair (per Table 1 of ANSI N510), will comply with this position. The guidance in "Testing of Ventilation Systems," Section 9 of "Industrial Ventilation," will be applied to any testing performed.

Unit Inlet or Outlet

	Local Panel	Main Control Room
SRP Table 6.5.1-1	Flow rate (indication)	Flow rate (recorded indication, high alarm and low alarm signals)
ABWR SGTS	F(1) 018B(C)	Inlet flow rate (recorded indication, low alarm); FRS618B(C), FI618B(C). Inlet temperature (indication); TI602B(C)

Local: ABWR design is in compliance with SRP Table 6.5.1-1.

MCR: SRP Table 6.5.1-1 includes a high alarm signal to detect high flow rate at the system inlet or outlet. The ABWR SGTS does not have this high alarm. A flow rate higher than the design value may indicate a potential failure in the fan or an increase in secondary containment leakage. However, as long as a negative pressure is maintained in the secondary containment, SGTS function is accomplished. Low negative secondary containment pressure is alarmed in the main control room. Operation of the SGTS to mitigate offsite releases will not be affected by the absence of the high flow alarm at the local panel. MCR

In addition, the ABWR SGTS design provides inlet temperature indication which is used in concert with downstream temperature measurement as a second means to determine relative humidity in the process stream to the charcoal adsorber. Direct moisture measurement is the primary means to determine charcoal adsorber inlet relative humidity and is discussed in a later section of this response.

Moisture Separator

	Local Panel	Main Control Room
SRP Table 6.5.1-1	Pressure drop (indication) (optional high alarm signal)	None
ABWR SGTS	Pressure drop (indication); DPI003B(C), DPI103B(C)	Pressure drop (indication); DPI603B(C)

The ABWR design is in compliance with SRP Table 6.5.1-1.

high temperature during SGTS operation, deluge actuation may be warranted. Pressure drop is provided at a local rack (for testing) and in the MCR.

The ABWR SGTS design exceeds the requirements of SRP Table 6.5.1-1.

Space between Adsorber and Second HEPA Filter (Post-HEPA)

	Local Panel	Main Control Room
SRP Table 6.5.1-1	Temperature (two-stage high alarm signal)	Temperature (indication, two-stage high alarm signal)
ABWR SGTS	None	Temperature (single division of indication, control and trip, two stage high alarm); TI616, TS015, TS616 Space heater hand switch and status indication.

Local: Local temperature alarms are not provided since the area is not continuously manned. Appropriate alarms and indication are provided in the control room along with the necessary controls to respond to a high temperature signal.

MCR: The intent of the SRP MCR position, judging from Footnote 2 of Table 4-1 of ASME N509, is to provide an alarm on high temperature and signal for manual deluge actuation on a high-high temperature alarm. The space heaters are operational only when SGTS is on standby. High temperature gives an alarm in the MCR and cuts power to the heaters. The space heaters will restart when low temperature coincident with space heater operation (i.e., not of service) is detected.

Each space heater heating element is provided with status indication. Each space heater fan is provided with a hand switch and status indication.

The need for deluge actuation is discussed in a later section of this Appendix, "Deluge Valves," and also in Subsection 6.5.1.3.3, "SGTS Filter Train."

pressure drop indication in the MCR. The ABWR SGTS design meets the requirements of STP Table 6.5.1-1.

Other—Secondary Containment Differential Pressure

	Local Panel	Main Control Room
SRP Table 6.5.1-1	None	None
ABWR SGTS	None	Differential pressure (four divisions of indication and high and low alarms)

The ABWR SGTS design exceeds the requirements of SRP Table 6.5.1-1. Measurement of secondary containment pressure with respect to the environs is a fundamental system parameter which is specified within, and is under the control of, the ABWR SGTS design.

Other—Loop Seals

	Local Panel	Main Control Room
SRP Table 6.5.1-1	None	None
ABWR SGTS	None	Level (two divisions of low alarm)

Loop seals are provided within the dryer and filter train and in the piping downstream of the filter train discharge block valves. Redundant low level alarms are provided to assure loop seal level is maintained. The loop seals function to continuously and passively drain any accumulation of water in the SGTS. Accumulation of water in piping to the stack has been a problem in operating plants.