3/4.3.7.6 SOURCE RANGE MONITORS

The source range monitors provide the operator with information of the status of the neutron level in the core at very low power levels during startup and shutdown. At these power levels, reactivity additions should not be made without this flux level information available to the operator. When the intermediate range monitors are on scale adequate information is available without the SRMs and they can be retracted.

The SRMs are required OPERABLE in OPERATIONAL CONDITION 2 to provide for rod block capability, and are required OPERABLE in OPERATIONAL CONDITIONS 3 and 4 to provide monitoring capability which provides diversity of protection to the mode switch interlocks.

3/4.3.7.7 TRAVERSING IN-CORE PROBE SYSTEM

The OPERABILITY of the traversing in-core probe system with the specified minimum complement of equipment ensures that the measurements obtained from use of this equipment accurately represent the spatial neutron flux distribution of the reactor core.

The TIP system OPERABILITY is demonstrated by normalizing all probes (i.e., detectors) prior to performing an LPRM calibration function. Monitoring core thermal limits may involve utilizing individual detectors to monitor selected areas of the reactor core, thus all detectors may not be required to OPERABLE. The OPERABILITY of individual detectors to be used for monitoring is demonstrated by comparing the detector(s) output with data obtained during the previous LPRM calibrations.

3/4.3.7.8 CHLORINE DETECTION SYSTEM - DELETE -

The OPERABILITY of the chlorine detection system ensures that an accidental chlorine release will be detected promptly and the necessary protective actions will be automatically initiated to provide protection for control room personnel. Upon detection of a high concentration of chlorine, the control room emergency ventilation system will automatically be placed in the isolation mode of operation to provide the required protection. The detection systems required by this specification are consistent with the recommendations of Regulatory Guide 1.95 "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release", Revision 1, January 1977.

3/4.3.7.9 FIRE DETECTION INSTRUMENTATION

OPERABILITY of the detection instrumentation ensures that both adequate warning capability is available for the prompt detection of fires and that fire suppression systems, that are actuated by fire detectors, will discharge extinguishing agent in a timely manner. Prompt detection and suppression of fires will reduce the potential for damage to safety-related equipment and is an integral element in the overall facility fire protection program.

In the event that a portion of the fire detection instrumentation is inoperable, increasing the frequency of fire watch patrols in the affected area(s), or zone(s), is required to provide detection capability until the inoperable instrumentation is restored to OPERABILITY.

INSTRUCTIONS

- DELETE -

CHLORINE DETECTION SYSTEM

LIMITING CONDITION FOR OPERATION

3.3.7.8 Two independent chlorine detection channels shall be OPERABLE with their trip setpoints adjusted to actuate at a chlorine concentration of less than or equal to 5 ppm.

APPLICABILITY: All OPERATIONAL CONDITIONS.

ACTION:

a. With one chlorine detection channel inoperable, restore the inoperable detection channel to OPERABLE status within 7 days, or within the next 6 hours, initiate and maintain operation of at least one control room emergency filtration system subsystem in the isolation mode of operation.

b. With both chlorine detection channels inoperable, within one hour initiate and maintain operation of at least one control room emergency filtration system subsystem in the isolation mode of operation.

c. The provisions of Specification 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.7.8 Each of the above required chlorine detection channels shall be demonstrated OPERABLE by performance of a CHANNEL CHECK at least once per 12 hours, a CHANNEL FUNCTIONAL TEST at least once per 31 days and a CHANNEL CALIBRATION at least once per 6 months.

2. Verifying that the subsystem satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the system flow rate is 4000 cfm ± 10%.

3. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.

4. Verifying a subsystem flow rate of 4000 cfm ± 10% during subsystem operation when tested in accordance with ANSI N510-1975.

c. After every 720 hours of charcoal adsorber operation by verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Positon C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of Regulatory Position C.6.a of Regulatory Guide 1.52, Revision 2, March 1978.

d. At least once per 18 months by:

1. Verifying that the pressure drop across the combined HEPA filters and charcoal adsorber banks is less than 7.2 inches Water Gauge while operating the subsystem at a flow rate of 4000 cfm ± 10%.

2. Verifying that the subsystem receives an appropriate isolation actuation signal by each of the following test conditions. For at least one of the test conditions, verify that the subsystem automatically switches to the isolation mode of operation and the isolation valves close within 4 seconds.

a) High high radiation in the outside air intake duct,
~~b) High chlorine concentration in the outside air intake duct,~~
b) ~~c)~~ High drywell pressure,
c) ~~d)~~ Low low reactor water level, and
d) ~~e)~~ Manual initiation from the Control Room.

3. Verifying that the heaters dissipate 20.7 ± 2.1 kW when tested in accordance with ANSI N510-1975 (except for the phase balance criteria stated in Section 14.2.3).

e. After each complete or partial replacement of a HEPA filter bank by verifying that the HEPA filter banks remove greater than or equal to 99.95% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 4000 cfm ± 10%.

f. After each complete or partial replacement of a charcoal adsorber bank by verifying that the charcoal adsorbers remove 99.95% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 4000 cfm ± 10%.

Offsite Chlorine Accident Probability Study

To demonstrate that a chlorine spill on the Mississippi River would not affect the GGNS Control Room, a probability study was performed.

The probability, P, of a chlorine spill from barge traffic in the vicinity of the Grand Gulf site is calculated by:

$$P = P_1 \times P_2 \times P_3 \times L$$

where:

P_1 = probability of a barge accident involving a spill per mile traveled per year;

P_2 = probability of a barge carrying chlorine passing the site;

P_3 = probability of wind occurrence that would carry the chlorine vapor from the release point to the control room;

L = length of the river along which a spill would cause a hazard to the Control Room.

Records from the National Response Center, U. S. Coast Guard, Washington, D.C., show a total of eleven accidents involving spills on the lower Mississippi River between Baton Rouge, Louisiana, and Cairo, Illinois, within the nine year period from 1973 to 1982. The length of the river between the two cities in 726 miles. None of the eleven spills involved chlorine.

Therefore P_1 is calculated as follows:

$$P_1 = \frac{\text{Number of accidents}}{\text{Number of years} \times \text{length of river considered}}$$

$$P_1 = \frac{11}{9 \text{ years} \times 726 \text{ miles}} = 1.684 \times 10^{-3}/\text{year-mile}$$

Records from the Chlorine Institute, New York, New York, show a total of 220,000 tons of chlorine transported on the lower Mississippi River in 1980. Based on an average content of 1100 tons per barge, this corresponds to 200 barges per year. Records from the U. S. Army Corps of Engineers, Vicksburg, Mississippi, for 1979 through 1981, show an average of 147,517 barges per year pass by on the lower Mississippi River. Therefore, P_2 is calculated as follows:

$$P_2 = \frac{\text{Number of chlorine barges per year}}{\text{Number of barges per year}}$$

$$P_2 = \frac{200}{147{,}517} = 1.356 \times 10^{-3}$$

The probability of the spill occurrence can be further reduced by including the site-specific meteorological and terrain factors. The surrounding terrain of the Grand Gulf site is gently rolling to the east and flat to the west. The site lies about 7300 feet east of the Mississippi River, about 132 feet above mean sea level (MSL). The ground elevations in the floodplain vary between 60 to 80 feet above MSL and are wooded with trees about 50 feet high. The bluff which separates the floodplain from the hills averages about 70 feet in height and is punctuated by stream valleys and land depressions. Bayou Pierre, which runs generally from east to west, opens the bluff about two and a half miles to the south to meet the Mississippi River. To the north about two and a half miles, Big Black River empties into the Mississippi River.

Near the Grand Gulf site, the bluff is punctuated by a plant access road from the riverbank to the plant area. Based on the site terrain features, an accidental release of toxic vapor can only reach the control room air intake with a west-northwest (WNW) or northwest (NW) wind, providing the toxic chemical spill takes place along the river within a 0.5 mile radius of the access road. Spills under any other conditions will be shielded by the bluff or diverted by nearby rivers or stream valleys. From the three years (1972, 1974, 1976) of onsite meteorological data, the frequency of occurrence of WNW and NW winds is 8.1%. Therefore, the probability of wind occurrence, P_3, will be 0.081 and the length of the path of concern, L, will be one mile.

Therefore, the overall probability of an accident involving a chlorine spill on the Mississippi River near the GGNS per year is:

$$P = P_1 \times P_2 \times P_3 \times L$$

$$P = 1.684 \times 10^{-3}\text{/year-mile} \times 1.356 \times 10^{-3} \times 8.1 \times 10^{-2} \times 1 \text{ mile}$$

$$P = 1.849 \times 10^{-7}\text{/year}$$

The calculated probability of 1.849×10^{-7}/year is considered conservative since the study was based on all accidents involving spills, not just chlorine accidents. In addition, there are several mitigating circumstances which make the above analysis even more conservative:

- not all accidents will result in an uncontrolled release
- the portion of the river near GGNS is particularly safe in that it is wide and free of navigation hazards.

Using the previously described conservative approach, the probability is shown to be within the acceptance criteria of the NRC Standard Review Plan 2.2.3. The SRP states "the expected rate of occurrence of potential exposures in excess of the 10 CFR 100 guidelines of approximately 10^{-6}/year is acceptable if, when combined with reasonable qualitative argument, the realistic probability can be shown to be lower."