CONTROL RODS PROGRAM CONTROLS (Continued)

The RBM is designed to automatically prevent fuel damage in the event of erroneous rod withdrawal from locations of high power density during high power operation. Two channels are provided. Tripping one of the channels will block erroneous rod withdrawal soon enough to prevent fuel damage. This system backs up the written sequence used by the operator for withdrawal of control rods.

3/4.1.5 STANDBY LIQUID CONTROL SYSTEM

The standby liquid control system provides a backup capability for bringing the reactor from full power to a cold, Xenon-free shutdown, assuming that none of the withdrawn control rods can be inserted. To meet this objective it is necessary to inject a quantity of boron which produces a concentration of 660 ppm in the reactor core in approximately 90 to 120 minutes. A minimum quantity of 4587 gallons of solution containing a minimum of 5500 pounds of sodium pentaborate is required to meet this shutdown requirement. There is an additional allowance of 150 ppm in the reactor core to account for imperfect mixing. The time requirement was selected to override the reactivity insertion rate due to cooldown following the Xenon poison peak and the required minimum pumping rate is 41.2 gpm. The minimum storage volume of the solution is established to allow for the portion below the pump suction that cannot be inserted and the filling of other piping systems connected to the reactor vessel. The temperature requirement on the sodium pentaborate solution is necessary to ensure that the sodium pentaborate remains in solution.

Insert From Attach. A

With ~~redundant~~ two pumps and explosive injection valves and with a highly reliable control rod scram system, operation of the reactor is permitted to continue for short periods of time with the system inoperable or for longer periods of time with one of the redundant components inoperable.

Surveillance requirements are established on a frequency that assures a high reliability of the system. Once the solution is established, boron concentration will not vary unless more boron or water is added, thus a check on the temperature and volume once each 24 hours assures that the solution is available for use.

Replacement of the explosive charges in the valves at regular intervals will assure that these valves will not fail because of deterioration of the charges.

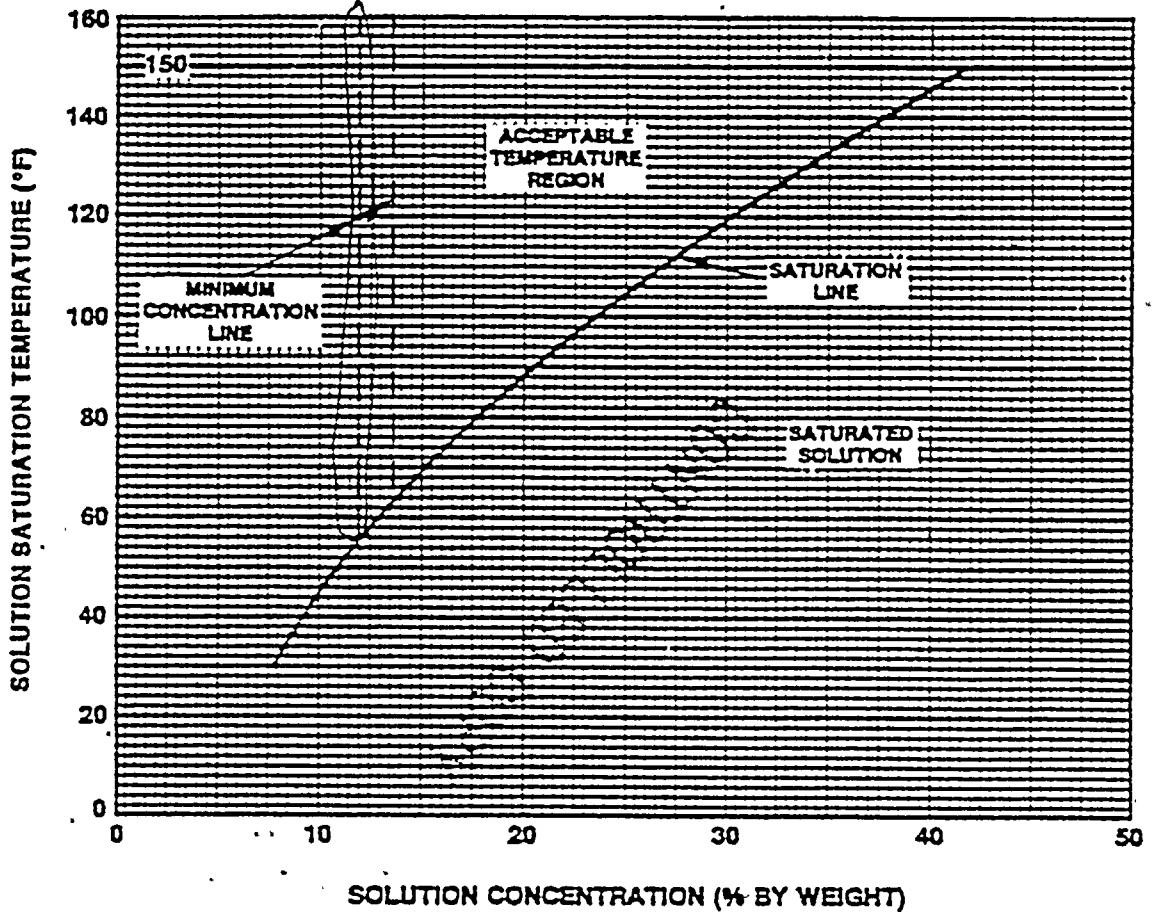
For Anticipated Transient Without Scram (ATWS), mitigation requires an equivalent 86 gpm -- 13% sodium pentaborate decahydrate pumping rate. This requirement is met by running both standby liquid control (SLC) pumps simultaneously. At the minimum allowable single pump pumping rate (41.2 gpm), and with two pumps operating, a 13.6% sodium pentaborate decahydrate concentration will provide the required equivalent injection rate. Maintenance of the SLC solution volume and concentration within the limits established assure that the single pump shutdown and ATWS requirements can be met.

Attachment A - Insert to BASES 3/4.1.5

To meet this objective, it is necessary to inject a quantity of boron which produces a concentration of 660 ppm in the reactor core. To account for imperfect mixing and leakage, an additional margin of 165 ppm boron equivalent is added. For RHR shutdown dilution, an additional quantity of boron equivalent of and 275 ppm is added to assure the final concentration will not be less than 660 ppm in the reactor core. To achieve this shutdown requirement, a minimum solution of 4587 gallons containing a minimum of 5500 pounds of sodium pentaborate decahydrate is required. This quantity of sodium pentaborate decahydrate will provide an undiluted concentration of 1100 ppm of boron in the reactor core.

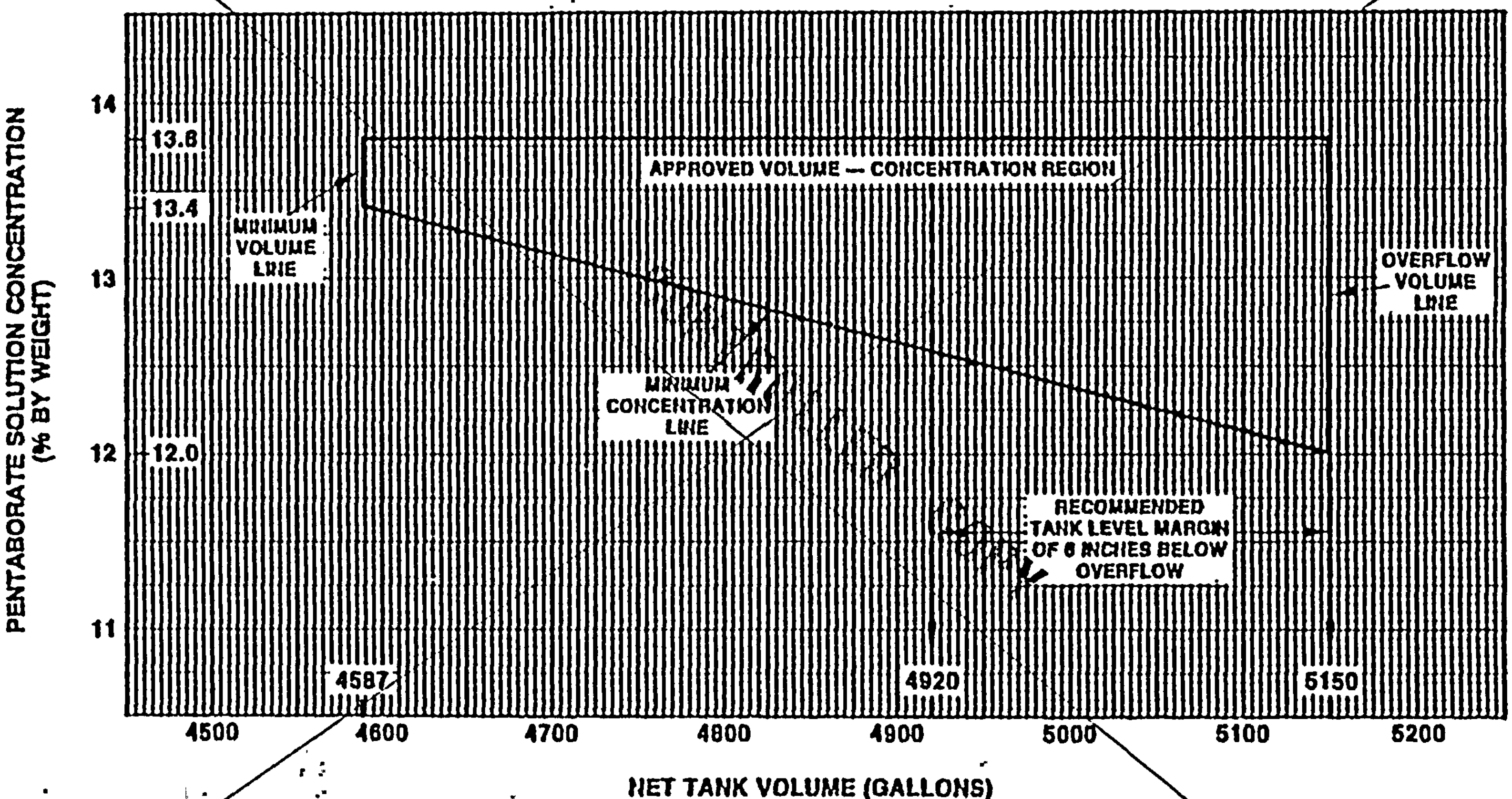
A minimum 41.2 gpm per pump injection rate has been selected to override the reactivity insertion rate due to cool down and zenon decay.

DELETE THIS LINE
ADD NEW LINE
AT 13,620



SODIUM PENTABORATE
SOLUTION SATURATION TEMPERATURE

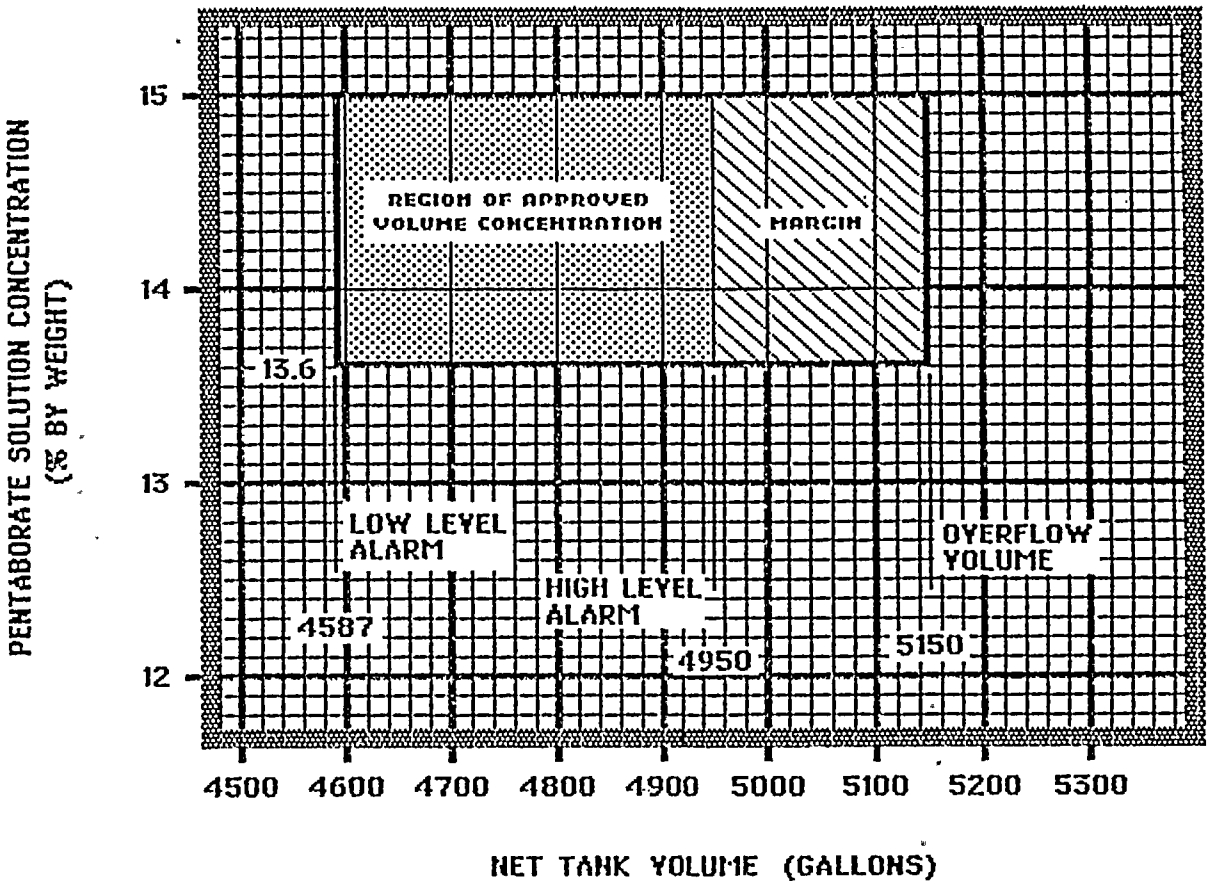
FIGURE 3.1.5-1



SODIUM PENTABORATE TANK, VOLUME VS. CONCENTRATION REQUIREMENTS

FIGURE 3.1.5-2

Replace with Attached Revision



SODIUM PENTABORATE TANK, VOLUME VS. CONCENTRATION REQUIREMENTS

FIGURE 3.1.5-2