TASK CLOSE OUT DOCUMENT

Task Scope Evaluation of pros and cons of alternate RHR system and make recommendations.

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Task No. 15

Date Complete April 15, 1979

Reason felt task is complete:

Report written including recommendations.

Members of Committee

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(signature)
Signed
Committee Leader

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INTRODUCTION

Problem Statement - Evaluate the pros and cons of the alternate RHR system and provide recommendations.

Summary of Action - The above problem was presented to the Industry Advisory Group which has made a brief investigation, summarized the perceived risks and advantages in regard to the various alternates and developed a set of recommendations.

RECOMMENDATIONS

The recommendations of the group are as follows:

1. Upgrade the present RHR systems to improve their reliability for long term operation under high radiation and minimum maintenance conditions. Make only those changes which are considered to be absolutely necessary. Some suggested areas are:

   - revise the pump motor lubricating system to function with the expected radiation exposure;

   - remove the strainers from the pump suction pipes if this has not already been done;

   - add remote instrumentation where such will be helpful in understanding system conditions (also consider relocating present instrumentation to minimize personnel exposures);

   - add drip catchers, dikes, or other means to minimize problems due to leaks;

   - add shielding in strategic locations to permit access with tolerable personnel exposures.

2. Arrange to have B&W engineers participate in the improvement program for the present RHR systems and the design of the new skid mounted RHR system.

3. Review all available data on operation of other RHR systems of the same design to identify problems and corrective actions taken.

4. Continue the design and construction of the skid mounted system including the excavation and other site work necessary to allow penetration of the auxiliary building wall.

5. We favor the addition of the new pipe connections to the existing RHR from the inside of the auxiliary building without breaching the wall if practical. Thus, providing that levels of exposure allow, we recommend installation of the tees and valves in the three RHR lines and stub off inside the building wall in such a location as to allow connection at a later date when the building wall would be penetrated from the outside.

6. If this is not practical, then build a valve pit outside of and against the auxiliary building of sufficient size to allow working space for cutting through the building wall and making up the piping. The valve pit should be essentially an extension of the auxiliary building and should meet all the design requirements of that building for handling and containing radioactive materials and for protection against external loadings; e.g., seismic, plane crash, etc. Once this valve pit is completed and sealed off, cut through the auxiliary building wall and install the pipe connections and valves.

7. Start now on a permanent building including planning for clean-up of the water systems and decontamination of the buildings. This building should have all the features necessary to the operation of radioactive material handling systems. The location selected for the skid mounted RHR system appears to be the best site for this permanent building. There should be no temporary building as currently planned. It's design should be revised to be permanent as described here.

8. Notwithstanding any of the above, the existing RHR systems availability should be maintained and, should the necessity arise, use the present systems. Once the new RHR system is installed in a structure equivalent to the present auxiliary building, use this new system in preference to the present systems. We strongly recommend against hooking up and operating the alternate RHR system without these provisions, unless it is deemed as absolutely necessary.

ALTERNATE RHR RISKS AND ADVANTAGES

The proposed alternate RHR (Reactor Heat Removal) system design was reviewed to identify potential risks and advantages which should be considered prior to breaching the reactor auxiliary building wall to make the final hook-up. The primary risks identified in order of decreasing importance are as follows:

1. The new system, as currently planned, will bring primary coolant outside the primary containment and auxiliary building and into a temporary housing of questionable integrity.

2. There is a high potential for impact on the on-going recovery program on the island due to radiation leakage to the local surroundings unless the temporary RHR building can be well-shielded and have provision for tight leakage control.

3. Cutting into and opening the auxiliary building, as currently planned, basically involves penetration of an important boundary to radiation release for the duration of the cut and repair, unless a permanent concrete structure with leak tightness, equal structural integrity to the auxiliary building and external access provision is first constructed around the intended location for the cut.

The secondary risks identified in order of decreasing importance are as follows:

4. Cutting into the existing RHR system suction pipe will remove both the existing RHR systems from service for the duration of the cut and closure, and will also run the risk of high dose due to possible suction line isolation valve leakage. The dosage risk also exists as each discharge line is cut into. However, since these cuts and closures would be made one line at a time there would always be at least one RHR system available for service if needed.

5. There would be a high risk of increased contamination of portions of the existing RHR system, i.e. discharge piping downstream of the RHR heat exchangers, and suction piping upstream of the RHR pumps, if the new alternate RHR system were used first, instead of using the existing RHR.

6. There is some risk that the very accelerated schedule for completing the design, fabrication and testing of the new system, introduces increased potential for design or operational problems resulting from error, as well as possible shortcuts on acceptance criteria.

The primary advantages identified in order of decreasing importance are as follows:

1. As currently planned, the addition of the alternate RHR, brings a new piping connection point to the primary system outside of the high radiation area. This connection point can be used for possible future primary coolant system additions or improvements that may be deemed necessary.

2. The addition of an alternate RHR provides one more backup cooling system that could be used if needed.

3. The alternate RHR system, as currently configured, has a minimum number of valves and better instrumentation for monitoring system performance than the existing system. This should minimize the potential operational problems.

4. The alternate RHR system, as currently configured, is outside the auxiliary building and would thus be more accessible for routine maintenance and surveillance.

DISCUSSION OF RISKS AND ADVANTAGES

Primary Risks

We view as the major concern the risks associated with bringing the primary coolant outside both the containment and the auxiliary building into the proposed temporary housing, "quonset hut." The proposed structure is of questionable integrity both from a radiation leakage concern and from ability to withstand unexpected (yet possible) external loadings; e.g., plane crash, truck or other site equipment. Bringing the high activity primary coolant into such a building

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One important additional action which should, however, be taken is to involve B&W engineers early in the design review process for the alternate system as well as for the design of any improvements planned for the existing RHR system.

Advantages

In our review, the most important advantage of the planned addition of an alternate RHR is that it creates a new piping connector point to the primary system outside of the high radiation. This connection point, whether it is used at this time or not, provides the flexibility for numerous possible future actions that may be desired; i.e., decontamination provision, methods for improved core cooling, etc. This may prove very useful and is a good insurance policy against potential future problems with operation in the cooled-down mode.

The obvious additional advantage is that one more alternate backup cooling system would be available if ever needed. While it is not currently intended for use unless necessary, if it were provided in an adequately designed structure, it would provide additional assurance of long-term safety.

There appears also to be an advantage to the alternate system in that it is designed to perform only one function, and as a consequence, has a minimum of unncessary frills; e.g., a minimum number of valves. Also, the alternate system appears to have more complete instrumentation for monitoring operational performance.

The final advantage identified in this review is that the alternate RHR system, as currently configured outside the auxiliary building, would be more accessible for routine maintenance and surveillance. This is an obvious advantage which would make it more desirable as a long-term cooling system if one were needed.