September 29, 1982

Docket No. 50-29
LS05-82-09-087

Mr. James A. Kay
Senior Engineer - Licensing
Yankee Atomic Electric Company
1671 Worcester Road
Framingham, Massachusetts 01701

Dear Mr. Kay:

SUBJECT: YANKEE NUCLEAR POWER STATION - SEP TOPIC III-4.C, INTERNALLY GENERATED MISSILES

Enclosed is the staff's evaluation of SEP Topic III-4.C, for the Yankee Plant. This evaluation is based on our review of your topic safety assessment report submitted by letter dated March 18, 1982, and information discussed over the telephone on August 23, 1982.

Based on our review and evaluation, we conclude that the generation of internal missiles within Yankee will not prevent the plant from being safely shutdown. However, the potential for a radioactive release due to missile damage of the liquid and gaseous waste processing systems will be evaluated during the integrated assessment of the Yankee Plant.

This evaluation will be a basic input to the integrated safety assessment for your facility unless you identify changes needed to reflect the as-built conditions at your facility. This assessment may be revised in the future if your facility design is changed or if NRC criteria relating to this subject is modified before the integrated assessment is completed.

Sincerely,

Ralph Caruso, Project Manager
Operating Reactors Branch No. 5
Division of Licensing

SE04
DSU USE EX (11)

Enclosure:
As stated

cc w/enclosure:
See next page

9/29/82

OFFICE	SEPB:DL	SEPB:DL	SEPB:DL	SEPB:DL	ORB#5:PM	ORB#5:BC	AD:SA:DL
SURNAME	TMichaels:dk	MBoyle	CGrimes	WRussell	RCaruso	DCrutchfield	FMiraglia
DATE	9/15/82	9/15/82	9/ /82	9/ /82	9/22/82	9/27/82	9/ /82

Mr. James A. Kay

cc
Mr. James E. Tribble, President
Yankee Atomic Electric Company
1671 Worcester Road
Framingham, Massachusetts 01701

Chairman
Board of Selectmen
Town of Rowe
Rowe, Massachusetts 01367

Energy Facilities Siting Council
14th Floor
One Ashburton Place
Boston, Massachusetts 02108

U. S. Environmental Protection
Agency
Region I Office
ATTN: Regional Radiation Representative
JFK Federal Building
Boston, Massachusetts 02203

Resident Inspector
Yankee Rowe Nuclear Power Station
c/o U.S. NRC
Post Office Box 28
Monroe Bridge, Massachusetts 01350

Ronald C. Haynes, Regional Administrator
Nuclear Regulatory Commission, Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

ENCLOSURE

SAFETY EVALUATION REPORT
SYSTEMATIC EVALUATION PROGRAM
TOPIC III-4.C INTERNALLY GENERATED MISSILES

I. INTRODUCTION

Missiles which are generated internally to the reactor facility (inside or outside containment) may cause damage to structures, systems and components that are necessary for the safe shutdown of the reactor facility or accident mitigation and to the structures, systems and components whose failure could result in a significant release of radioactivity. The potential sources of such missiles are valve bonnets, and hardware retaining bolts,relief valve parts, instrument wells, pressure containing equipment such as accumulators and high pressure bottles, high speed rotating machinery, and rotating segments (e.g., impellers and fan blades).

Scope of Review

The scope of the review is as outlined in the Standard Review Plan (SRP) Section 3.5.1.1, "Internally Generated Missiles (Outside Containment)," and SRP Section 3.5.1.2, "Internally Generated Missiles (Inside Containment)." The review specifically excludes SRP Section 3.6.1, "Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment," 3.6.2, "Determination of Break Locations and Dynamic Effects Associated with the Postulated Rupture of Piping," as well as those SRP sections dealing with natural phenomena (including missiles generated by natural phenomena), missiles generated outside the facility, and turbine missiles.

II. REVIEW CRITERIA

The acceptability of the design of protection for facility structures, systems and components from internally generated missiles is based on meeting the following criteria:

1. General Design Criterion 4, "Environmental and Missile Design Bases" with respect to protecting structures, systems and components against the effects of internally generated missiles to maintain their essential safety functions.
2. Regulatory Guide 1.13, "Spent Fuel Storage Facility Design Bases" as related to the spent fuel pool systems and structures being capable of withstanding the effects of internally generated missiles and preventing missiles from impacting stored fuel assemblies.
3. Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants" as related to the ultimate heat sink being capable of withstanding the effects of internally generated missiles.

III. RELATED SAFETY TOPICS AND INTERFACES

Review Areas Outside the Scope of this Topic

As previously stated, this review specifically excludes the fol' wing:

1. SRP Section 3.6.1, "Plant Design for Protection Against Postulated Piping Failure in Fluid Systems Outside Containment" - This matter will be covered under Safety Topic III.5.B, "Piping Break Outside Containment."

2. SRP Section 3.6.2, "Determination of Break Locations and Dynamic Effects Associated with the Postulated Rupture of Piping" - This matter will be covered under Safety Topic III-5.A, "Effects of Pipe Break on Structures, Systems and Components Inside Containment."
3. Natural Phenomena - This matter will be covered under Safety Topics III-6, "Seismic Design Considerations" and III-4.A, "Tornado Missiles."
4. Turbine Missiles - This matter will be covered under Safety Topic III-4.B, "Turbine Missiles."

Interfaces with Other SEP Safety Topics

Satisfactory resolution of the following safety topics will depend, at least in part, on the satisfactory resolution of this topic:

1. Topic VII-3, "Systems Required for Safe Shutdown."
2. Topic VII-4, "Effects of Failure in Non-Safety Related Systems On Selected Engineered Safety Features." This topic was deleted for Yankee Rowe.
3. Topic IX-1, "Fuel Storage."
4. Topic IX-3, "Station Service and Cooling Water System."
5. Topic II-3.C, "Safety-Related Water Supply (Ultimate Heat Sink)."

IV. REVIEW GUIDELINES

Systems and components needed to perform safety functions were identified as those listed in SRP Section 3.2.2, "Systems Quality Group Classification."

1. Systems needed to perform safety functions (safe plant shutdown or accident mitigation) are:
   a. Main Coolant System
   b. Safety Injection System

c. Chemical and Volume Control System

d. Shutdown Cooling System

e. Component Cooling Water System

f. Service Water System

g. Compressed Air System

h. Diesel Generator Auxiliary Systems

i. Portions of Main Steam System

j. Portions of Main Feedwater and Condensate Systems

k. Emergency Feedwater System

l. Ventilation Systems

m. Condensate Storage System

n. Containment Heat Removal System

o. Combustible Gas Control System

2. Systems whose failure may result in release of unacceptable amounts of radioactivity:

   a. Spent Fuel Pool Cooling System

   b. Sampling System

   c. Liquid Waste Processing System

   d. Gaseous Waste Processing System

   e. Containment Purge System

3. Additionally, there are electrical and instrumentation systems which are necessary to support safe shutdown operations:

   a. Diesel Generators

   b. Station Batteries and Distribution Cabinets

   c. Emergency 480V Switchgear

   d. Control Room

   e. Switchgear Room

   f. Cable Tray Room

V. REVIEW AND EVALUATION

1. Systems Needed to Perform Safety Functions

a. Main Coolant System

The main coolant system serves as the pressure retaining boundary for the primary coolant and is comprised of a reactor vessel and four parallel heat transfer loops. Each loop contains one steam generator; one circulating pump, a check valve, two stop valves, associated piping and instrumentation. A pressurizer and safety valves are connected to one of the loops. All components of the main coolant system are located within the vapor container, a spherical steel vessel which surrounds the reactor.

The reactor vessel head is secured by 52 closure studs and nuts. It is unlikely that any of the studs would become a missile because of the pressurizer relief valves and the main steam pressure relief valves which assure the coolant system pressure does not exceed design limits. Therefore, these studs are not subjected to sufficient stress to create an accelerating force sufficient to cause them to become missiles.

The pressurizer pressure relief valves have the potential for becoming missiles. Both the power operated relief valve and the two safety valves are mounted on top of the pressurizer. The position of the pressurizer is above the steam generator loops and is enclosed in a concrete compartment. A valve failure could result in debris which would strike the overhead or side walls, and would not likely result in damage to other components or piping of the main coolant system.

The control rod drive modules are mounted on top of the reactor vessel and are considered as an extension of the reactor vessel head. Each module is attached to a threaded connection on the reactor vessel head and seal welded. The drive modules are further covered with a missile shield fabricated from 1 and 2 inch thick steel plate backed up by 18 inches of concrete. The control rod drive module design and the associated missile cover will preclude safety system missile damage.

Instrumentation generally requires some penetration into the main coolant system. These penetrations are usually small and take the form of welded wells. Should a penetration well fail, it will compromise the safety of the main coolant system due to the well orientation and the small resulting opening in the pressure boundary.

The possibility that missiles could be generated due to destructive overspeeding of a main coolant pump in the event of a pipe break in the pump discharge was considered. The ejection of a potentially damaging impeller missile is minimized by the massive steel of the pump casing.

Generation of missiles from overspeed of the motor, flywheel and the impeller is a generic problem reviewed under SEP Topics II-10.B, "Pump Flywheel Integrity" and V-7, "Reactor Coolant Pump Overspeed." These topics were deleted for Yankee Rowe as the pumps do not have a flywheel which generates the most damaging missiles.

The four steam generators have manways held in position by studs on the primary and secondary sides of the shell. The licensee stated that these studs are not subjected to sufficient pressure to result in a significant missile source. In the event a stud became a missile, the location of the steam generators within concrete enclosures and the missile trajectory would preclude resulting missile damage.

In summary, relative to the Main Coolant System, it is considered that the likelihood of missile generation, and resultant damage, is minimized by virtue of equipment design features, component arrangement and compartmentalization.

b. Safety Injection System

The safety injection system serves as the means of injecting water for core protection in the event of primary coolant system water loss. The safety injection system consists of three sets of low and high pressure injection pumps in series to boost the final discharge pressure, a safety injection accumulator, a safety injection tank and associated piping and instrumentation. The safety injection flow is directed to the main coolant system through the four cold leg reactor inlet pipes.

The safety injection tank serves as the water source for the safety injection system. The tank is located behind the diesel generator building. The position of the tank behind the diesel generator building provides protection from internally generated missiles. The main components of the safety injection system redundant trains are located in the diesel generator building. Refer to Section 1h for the discussion about internally generated missiles from the diesel generator system. The most likely sources of internally generated missiles are the low and high pressure safety injection pump. These pumps are horizontal, multistage centrifugal pumps which operate at 3,600 rpm. These pumps have a thick steel casing, making it highly improbable that a missile, such as a broken impeller, would penetrate the casing and cause any damage.

The safety injection accumulator is located outside containment adjacent to the diesel generator building. The normally depressurized accumulator discharges into the low pressure injection header. The high and low pressure piping follows a common path, through the radioactive pipe tunnel and passes through containment penetrations. The piping is kept below the operating floor and connects to the four reactor cold legs. This safety injection piping within the vapor container may be subject to damage from internally generated missiles. Each leg of the high pressure safety injection header incorporates a throttle valve to maintain header pressure and injection to the intact loops in the event of a break in one of the injection lines. Thus, the system would perform in its design mode and supply the necessary coolant through the redundant pipes.

In summary, the safety injection system, because of its functional design, redundant features and equipment design, will be capable of performing its design function considering internally generated missile sources as discussed above.

c. Chemical and Volume Control System

The Chemical and Volume Control System (CVCS) controls and maintains the main coolant system inventory through the process of makeup and letdown. The system consists of a regenerative heat exchanger to cool the excess coolant removed from the main coolant system during plant heatup and operation, a set of orifices connected in parallel to reduce the downstream pressure to 15 psig, a low pressure surge tank which is drawn on by the purification system to remove corrosion and fission products, a low pressure surge tank cooler, and three high pressure charging pumps to return the coolant to the main coolant system.

The regenerative heat exchangers are located within the vapor container while the remaining equipment is within the primary auxiliary building. These components are within individual compartments which contain no other missile producing equipment.

The most likely source of missiles in the CVCS would be generated along the letdown line within the vapor container upstream of the pressure reducing orifices and along the lines from the charging pumps to the main coolant system. The CVCS is not fully redundant and a missile could disable the system. The licensee stated that a failure in the CVCS could be accommodated and the plant brought to cold shutdown by using the emergency feedwater system, the shutdown cooling system and the safety injection system.

In summary, we conclude that the possibility of internal missile damage to the CVCS is low and that such damage will not result in an unacceptable release of radioactivity. Further, missile damage to the system will not affect the safe shutdown of the facility.

d. Shutdown Cooling System

The shutdown cooling system is designed to remove core decay heat during extended shutdown periods. The system is brought into use after the primary coolant temperature and pressure fall below 330°F and 300 psig, respectively. The shutdown cooling system is composed of the shutdown cooling heat exchanger, shutdown cooling pump and associated valves and piping. The system circulates main coolant from the hot leg of a primary loop, through the heat exchanger and back to the cold leg of the same primary loop. The heat exchanger transfers the decay heat to the component cooling system. Isolation valves are provided within the vapor container.

While the shutdown cooling system is not completely redundant, the low pressure surge tank cooling system pump and heat exchanger can be substituted for the identical associated shutdown cooling components. The major components are all located within separate shielded compartments within the primary auxiliary building. The only missile sources are the shutdown cooling and low pressure surge tank cooling pumps. The system piping is run within shielded enclosures since it contains main coolant. A missile strike to the system would not require plant shutdown as the system could be isolated from the main coolant system and repaired.

In summary, because of the equipment separation, the substantial component shielding and the component redundancy, we conclude that the shutdown cooling system is adequately protected from internally generated missiles.

e. Component Cooling Water System

The component cooling water system is provided to dissipate waste heat from various nuclear steam supply system components. The system consists of two parallel circulating pumps rated at 125 hp and 2,000 gpm, two parallel horizontal heat exchangers, a surge tank, a chemical addition tank and associated piping and valves. The main components are located in the primary auxiliary building. Heat absorbed by the component cooling water system is transferred to the service water system via heat exchangers and released into Sherman Pond (see also Topic IX-3, "Station Service and Cooling Water System").

The component cooling water system removes heat from the shutdown cooling heat exchangers, the spent fuel pool heat exchanger, the neutron shield tank, the main coolant pumps, low pressure surge tank heat exchanger and various waste disposal components.

We conclude that this system is an unlikely source of missiles due to its low operating pressure and temperature. Further, potential missile sources were not identified which might endanger the component cooling water system. However, should a missile strike occur, it would be necessary to shut the reactor down as the main coolant pumps would not have adequate cooling. The loss of component cooling water flow is alarmed to enable a timely shutdown. Residual heat could be removed via the auxiliary feedwater system and steam generators until repairs could be made to the component cooling water system. Provisions are available so that service water or fire protection system water can be introduced to the component cooling water system.

In summary, we conclude that the possibility of missile damage to the component cooling system is highly unlikely. In the event the system were disabled, decay heat would be removed from the steam generators by the auxiliary feedwater system. It would be necessary to make repairs to the system to achieve cold shutdown.

f. Service Water System

The service water system provides water from Sherman pond for both primary and secondary plant functions. The system components are three 125 hp., 2,500 gpm, 50% capacity motor driven pumps located in the screenwell house, redundant 12 inch lines which run parallel to the turbine building basement, lines to the primary auxiliary building and other associated piping. (See also SEP Topic IX-3, "Station Service and Cooling Water System.")

The primary plant functions which are cooled by the service water system are the component cooling water heat exchangers, the vapor container coolers, steam generator blowdown coolers, charging pump cooling, shutdown cooling pump cooling and cooling for the low pressure surge tank pumps.

The secondary plant services include the traveling water screen washing, air compressor cooling, boiler feed pump cooling and other miscellaneous loads.

We conclude that the three vertical motor driven service water pumps are unlikely missile generators because of their substantial casing, their submergence in the intake structure, the low operating speed (1,750 rpm) and low operating pressure (100 psig) and would not endanger the service water system piping and valves within the intake structure. The three pumps are sufficiently separated such that a missile from one pump would not result in damage to the redundant pumps. Other equipment within the intake structure includes two electric driven fire pumps and two circulating water pumps. These components are considered to be unlikely missile generators for the reasons presented for the service water pumps.

The primary safety loads on this system are the component cooling heat exchangers. In the event that the service water system is disabled, connections can be made from the fire protection water supply system to absorb the heat load imposed by the component cooling heat exchangers.

In summary, we therefore conclude that the service water system meets the requirements of protection against internally generated missiles and that alternate cooling is available for the safety related component cooling heat loads.

g. Compressed Air System

The compressed air system is designed to supply oil free air to both the control air and service air systems. The control air compressors provide 100 psig air to the instrument and control air systems. A third compressor provides 100 psig air to the service air system. The air receivers are interconnected. The control air manifolds receive air which has passed through filters and dryers. The service air is provided directly from the service air receiver.

All of the compressed air system major components are located on the turbine building ground floor. Because of the low pressure and speed of the compressor units, the system is not considered to be a missile source. However, a main feedwater system pump in the same area could be a source of missiles which could disable the compressed air system. Upon loss of compressed air, the safety-related equipment could be operated manually or with backup nitrogen supplies. An available operating procedure defines the immediate actions which are required to shutdown the plant upon loss of the control air supply.

In summary, the possibility of internal missile damage to the compressed air system is low and such damage will not prohibit safe shutdown of the plant.

h. Diesel Generator Auxiliary Systems

Three diesel generators are located at the north end of the diesel generator building. The three units and their auxiliaries are located in separate compartments. The diesel generators are low speed, 400 KW units. Potential system missiles, such as the diesel pistons, would not affect the redundant generators as the generators are separated by intervening walls. The safety injection pumps are located within the diesel generator building but as discussed in Section 1b, these pumps are not considered to be a potential missile source due to their thick casing.

In summary, due to the separation, compartmentalization, and independence of the diesel generators and their associated auxiliary systems, the diesel generator system meets the requirements for protection against internally generated missiles.

i. Portions of Main Steam System

The main steam system consists of four steam generators and the steam lines which connect to the turbine. The steam generators are located within the vapor container. Four 14 inch steam lines penetrate containment and have non-return, safety and atmospheric dump valves exterior to containment. The four lines merge into a single 24 inch line within the turbine building and further split into two lines prior to the turbine throttle valves.

The main steam lines are of heavy walled construction and are unlikely to be damaged by internally generated missiles. Should a missile cause damage downstream of the non-return valves, the valves could close and the plant could be safely shutdown. SEP Topic XV-2, "Spectrum of Steam System Piping Failures Inside and Outside Containment," considered a break upstream of the non-return valves. Emergency procedures are available to isolate the faulted steam generator. Excessive overcooling is prevented by closing the non-return valves on the three unaffected steam generator steam lines.

In summary, we conclude that the main steam system will be capable of performing its design function considering internally generated missiles.

j. Portions of Main Feedwater and Condensate Systems

The main feedwater system consists of three motor-driven boiler feed pumps which deliver water to the four steam generators. Condensate from the hot well is pumped by three motor-driven condensate pumps through the air ejectors, gland seal condensers and preheaters to the boiler feed pumps. The feedwater is delivered through containment to the steam generators. The only area of concern is the piping from the boiler feed pumps, which runs through the ground floor of the turbine building then outside the turbine building wall to the vapor container.

Each steam generator is provided with a check valve to prevent blowdown due to missile damage along the boiler feed pump discharge line. The plant can be safely shutdown by removing decay heat through any one steam generator with the emergency feedwater system providing feedwater from the primary auxiliary building.

In summary, we conclude that the possibility of internal missile damage to the feedwater and condensate systems is low and that such damage will not prohibit safe shutdown of the plant.

k. Emergency Feedwater System

The emergency feedwater system consists of three 100% capacity pumps, two motor-driven and one turbine driven, which provide feedwater to any of the four steam generators through two separate flow paths. The normal emergency feedwater path utilizes the main feedwater piping to the steam generators. The alternate emergency feedwater piping utilizes the steam generator blowdown piping in the primary auxiliary building. The two paths join together inside the main coolant loop compartments within the vapor container.

The two motor-driven pumps are in the primary auxiliary building and the turbine-driven pump is in the turbine building.

Due to the pump and piping separation between the redundant trains, missile damage is precluded from degrading the system performance. We therefore conclude that the emergency feedwater system, through its redundancy and separation, is sufficiently protected with respect to internally generated missiles.

1. Ventilation Systems

   1. Diesel Generator Building

      The diesel generator building contains the separate diesel generator units and the safety injection equipment and switchgear. The ventilation equipment is thermostatically controlled for initiation of 95°F. The system circulates outside air through the building and exhausts through wall dampers. The diesel cubicles are ventilated by diesel cooling fans which are driven off the diesels.

   2. Control Room

      The control room is independently air conditioned by two separate ventilation units. Air is recirculated with fresh air added to create a slight positive pressure within the control room. Both fresh air and recirculated air are filtered prior to admittance to the control room.

The ventilation systems are low pressure systems, and therefore are not considered to be potential missile sources. While ductwork can be penetrated by missiles, the licensee stated that the total cooling capability is not lost for either area, and that time is available for action to restore adequate ventilation.

In summary, we conclude that the ventilation systems for these two areas will be capable of performing their design function considering internally generated missiles.

m. Condensate Storage System

The condensate storage system consists of a 30,000 gallon tank which provides makeup water for the main feedwater system and for the emergency feedwater system.

By virtue of the tank location in the station yard, exterior to all buildings, we did not identify potential missile sources near the tank.

We conclude that the condensate storage system is adequately protected against internally generated missiles.

n. Containment Heat Removal System

The containment heat removal system consists of four fans, four cooling coil assemblies and associated piping. Cooled water is provided from the service water system. The system limits the vapor container temperature to 120°F in the summer. Each cooling coil assembly is provided with an individual water supply and return line within containment.

In the event the system suffered missile damage, the resultant heat gain would slowly raise the interior vapor container temperature. The undamaged coil assemblies would provide sufficient cooling of the vapor container interior. Damage to the system could be detected and the plant safely shut down. We conclude that the containment heat removal system has a low probability of suffering missile damage and that its redundant cooling paths provide sufficient protection against internally generated missiles.

o. Combustible Gas Control System

The combustible gas control system consists of two purge lines equipped with solenoid valves. This piping is normally not pressurized and is not considered to be a source of missiles. The system is not needed to shut the plant down.

We conclude that the combustible gas control system is adequately protected against internally generated missiles as its loss due to missile damage will not affect safe plant shutdown nor result in a significant radioactivity release.

2. Systems Whose Failure May Result in Release of Unacceptable Amounts of Radioactivity

a. Spent Fuel Cooling System

The spent fuel cooling system is a closed loop system consisting of two full capacity pumps, one full capacity heat exchanger, piping, valves and instrumentation. Heat from the spent fuel pool is transferred by the heat exchanger to the component cooling water system. The majority of the equipment is located within the spent fuel pool building and the heat exchanger is in the primary auxiliary building fan room.

The spent fuel pool cooling system is a low energy system which is unlikely to generate missiles. Should the equipment become inoperable due to missile damage, there is sufficient time to effect repair or arrange for alternate cooling.

We thus conclude that the spent fuel cooling system is capable of performing its function considering internally generated missiles and that in the event of missile damage to the system there is sufficient time to initiate alternate means of spent fuel cooling or to perform repairs to the spent fuel cooling system.

b. Sampling System

The sampling provides reactor coolant system fluid samples for analysis. Samples are passed through a cooler and pressure reducing coil before entering the sample sink. Samples are taken for later analysis to the chemistry lab. All of the sampling operations are performed in a separate room with concrete walls. We consider the likelihood of missiles causing damage to the sampling system to be remote.

We conclude that the sampling system is sufficiently protected with respect to internally generated missiles as its loss will not affect safe shutdown capability or result in a significant radioactive relase

c. Liquid Waste Processing System

The liquid waste processing system is located in shielded areas of the waste disposal building which provides protection against internally generated missiles. The system pumps are low flow and low head, and therefore are considered unlikely missile sources.

The licensee has not demonstrated that missile damage to this system will not result in a significant radioactive release. We thus conclude that the liquid waste processing system has not been shown to be sufficently protected with respect to internally generated missiles as the potential for a radioactive release has not been evaluated. The integrated assessment should address this concern. --

d. Gaseous Waste Processing System

The gaseous waste processing system is operated at pressures less than 100 psig. The system is not likely to be a source of internally generated missiles. All of the system compressors and storage tanks are located behind shield walls. Many of the system components are similarly surrounded by shield walls.

This system is protected against missile sources of other systems and the likelihood for missile damage from sources within the system is low. Further, damage to this system will not affect safe shutdown of the plant. The licensee has not provided an evaluation of radioactive release due to missile damage.

We conclude that the gaseous waste processing system has not been shown to be protected against the effects of internally generated missiles as the potential for a radioactive release has not been evaluated. The integrated assessment should address this concern.

e. Containment Purge System

The containment purge system is provided to periodically purge the vapor container prior to entry. The system consists of a fan, filters, ductwork and isolation valves. All of these components except portions of the ductwork and the isolation valves are located in a room within the primary auxiliary building.

The licensee stated that the system is only operated with the reactor shut down. The system is only a potential missile source at that time since it is only pressurized during shutdown. The probability of this system producing missiles or being damaged by a missile is low. Should a missile damage this system, the damage would not interfere with safe shutdown.

We conclude that the containment purge system missile protection is acceptable.

3. Electrical and Instrumentation Systems to Support Safe Shutdown Operations

a. Diesel Generators

See Section V.1.h for the review of this system.

b. Station Batteries

Three battery systems are provided at separate locations. Two battery systems are located in the turbine building. The associated chargers and buses are immediately outside each battery room. The third battery and its auxiliary systems are in the diesel generator building. We conclude that adequate protection is provided for the station batteries against internally generated missiles as they are not required for safe shutdown.

c. 480 V Switchgear

The 480 V emergency switchgear is located in the diesel generator building, with motor control centers in the switchgear room and the primary auxiliary building.

The safety injection pumps are a potential missile source within the diesel generator building; however, their thick case precludes penetration of a missile, such as a broken impeller; refer to Section 1b for a discussion of the safety injection system.

We conclude that the 480 V switchgear is adequately protected against internally generated missiles.

d. Control Room

The control room is located on the operating floor level of the turbine building. Piping, pressurized sources or rotating machinery are not located within the control room. Ventilation duct is routed into the control room, however damaging missiles from the ventilation system are considered unlikely.

We conclude that there are no potential missile sources in this area which could affect safety functions.

e. Switchgear Room

The switchgear room is located directly below the control room. This room contains the 2400V switchgear, the 480V switchgear, two of the three battery rooms, dc switchgear, vital bus power supply, vital bus switchgear, emergency motor control center 1, and the control rod equipment panel. The switchgear room does not contain piping, pressurized sources or rotating equipment which could be a missile source. The switchgear room walls are of sufficient thickness to protect the equipment within from missiles generated in adjacent rooms.

We conclude that the switchgear room is adequately protected against internally generated missiles.

f. Cable Tray Room

The cable tray room is located directly above the control room. Cables are routed through the cable tray room enroute to the control room. The cable tray room does not contain any piping, pressurized sources or rotating equipment which might be a missile source.

We conclude that the cable tray room is adequately protected against internally generated missiles.

VI. CONCLUSIONS

Based on our review of the systems and components needed to perform safety functions, we conclude that the design of protection from internally generated missiles meets the intent of the criteria listed in Section II - REVIEW CRITERIA of Standard Review Plan Sections 3.5.1.1 and 3.5.1.2 with the exception of the liquid and gaseous waste processing systems. The integrated assessment should evaluate the potential for radioactive release from these systems due to missile damage.

VII. REFERENCES

1. Letter, YAEC to NRC, submitting safety analysis report for SEP Topic III-4.C, dated March 18, 1982.

2. Tele-conference, J. A. Kay, YAEC, and M. L. Boyle, NRC, et al., dicussion of SEP Topic III-4.C, August 23, 1982.