Jersey Central Power & Light Company

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MEMBER OF THE General Public Utilities Corporation

December 2, 1974

Mr. George Lear, Chief
Operating Reactors Branch #3
Directorate of Licensing
Office of Regulation
U.S. Atomic Energy Commission
Washington, DC 20545

Dear Mr. Lear:

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION
DOCKET NO. 50-219
GASEOUS RADIOACTIVE WASTE SYSTEM MODIFICATION

Your letters dated October 1, 1974 and October 30, 1974 requested that we provide assurance that we can accommodate four conditions with respect to the construction and operation of the Oyster Creek gaseous radioactive waste system modification as described in our June 1, 1973 submittal. On this basis you indicated that the proposed modifications are acceptable.

With the exception of the second provision, which we have altered to reflect the utilization of the average gamma energy per disintegration in the limit of the off gas radioactivity release rate at the end of the delay line, we have complied with your provisions. This is shown in the attached responses to your concerns.

The alteration of the second provision has not compromised the intent of your concern, but has merely modified the listing of the operating restriction in a manner which is more suitable for use as a Technical Specification limit.

Very truly yours,

Ivan R. Finfrock, Jr.
Vice President

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QUESTION

1. We find the proposed modifications for a non-seismic gaseous radioactive waste system is acceptable provided that you will commit to designing the systems to Quality Group D (augmented) as described in the enclosed Sections IV and V of "Design Guidance for Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants", dated August 28, 1974.

RESPONSE

The Augmented Offgas system will be designed to Quality Group D (augmented) as described in the referenced attachments. These attachments are reproduced on the following two pages.

IV. Definition of "Quality Group D (Augmented)"

In addition to the requirements inherent in the codes and standards listed in Regulatory Guide 1.26 for Quality Group D, the following criteria, as minimum, should be implemented for components and systems designated as "Quality Group D (Augmented)" in this guide.

a. The Quality Assurance provisions described in V of this guide should be applied.

b. Pressure retaining components of process systems should utilize welded construction to the maximum practicable extent. Flanged joints or suitable rapid disconnect fittings should be used only where maintenance or operational requirements clearly indicate that such construction is preferable. Screwed connections in which threads provide the only seal should not be used except for instrumentation connections where welded connections are not suitable. Process lines should not be less than 3/4 inch. Screwed connections backed up by seal welding, socket welding or mechanical joints may be used on lines greater than 3/4 inch but less than 2-1/2 inch nominal size. For lines of 2-1/2 inch nominal pipe size and above, pipe welds should be of the butt-joint type. Backing rings should not be used in lines carrying resins or other particulate materials. All welding constituting the pressure boundary of pressure retaining components should be performed by qualified welding procedures in accordance with ASME Pressure and Vessel Code Section IX.

c. Completed process systems should be pressure tested to the maximum practicable extent. Piping systems should be hydrostatically tested in their entirety utilizing temporary plugs at atmospheric tank connections. Testing of piping systems should be performed in accordance with ANSI B31.1, ASME NB-6111.1 and NB-6111.2, but in no case less than 75 psig. The test pressure should be held for a minimum of 30 minutes with no leakage indicated.

V. Quality Assurance for Radioactive Waste Management Systems

A program shall be established that is sufficient to assure that the design, construction, and testing requirements are met. The following areas should be included in the program:

a. Design and Procurement Document Control - Measures should be established to insure that the requirements of this design guide are specified and included in design and procurement documents and that deviations therefrom are controlled.

b. Control of Purchased Material, Equipment and Services - Measures should be established to assure that purchased material, equipment and construction services conform to the procurement documents.

c. Inspection - A program for inspection of activities affecting quality should be established and executed by, or for, the organization performing the activity to verify conformance with the documented instructions, procedures and drawings for accomplishing the activity.

d. Handling, Storage and Shipping - Measures should be established to control the handling, storage, shipping, cleaning and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration.

e. Inspection, Test and Operating Status - Measures should be established to provide for the identification of items which have satisfactorily passed required inspections and tests.

f. Corrective Action - Measures should be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment and nonconformances are promptly identified and corrected.

QUESTION

2. We find the proposed modifications for a non-seismic gaseous radioactive waste system is acceptable provided that the off gas radioactivity release rate from the steam jet air ejector will be limited to not greater than 260,000 μCi/sec (after a 30 minute delay).

RESPONSE

The Oyster Creek Technical Specifications presently state that:

"The maximum release rate of gross activity, except iodines and particulates with half lives longer than eight days, shall be limited in accordance with the following equation:

$$Q = \frac{.21}{\bar{E}} \text{ Ci/sec.}$$

where Q is the stack release rate (Ci/sec) of gross activity and $\bar{E}$ is the average gamma energy per disintegration (Mev/dis)."

The value 260,000 μCi/sec was chosen for the analysis of augmented off gas system influent activity rate because it represents the value Q most frequently derived from weekly $\bar{E}$ calculations. This value was assumed to be a constant influent to the off gas treatment system, resulting in much higher loading on the charcoal beds than will be the case during actual operation. This conservative assumption in conjunction with the large holdup time associated with the Augmented Offgas System results in calculated off-site doses less than those allowed in the proposed Appendix I.

As indicated in Semi-annual Reports #10 (1/1/74 - 6/30/74) and #6 (1/1/73 - 6/30/73) spikes in the release rate Q do occur when the mechanical vacuum pump is energized during startup after a shutdown of one to two days duration. The spikes may be of 5 to 10 minutes duration, but data has shown $\bar{E}$ under such conditions to be typically 0.09 Mev/dis, much lower than the average value of about 0.8 Mev/dis, and yielding an allowable Q value of 2.32 Ci/sec. This is within acceptable off-site dose limits in accordance with the Technical Specification noted above but is, of course, greater than the 260,000 μCi/sec limit required in your letter of October 1, 1974.

In view of the occurrence of these release rate spikes with very low $\bar{E}$ values, and in view of the importance of $\bar{E}$ in the dose considerations, it is requested that the off-gas radioactivity release rate Technical Specifications limit from the steam jet air ejector should be as follows once the augmented gas system becomes operational:

"The maximum influent rate of gross activity to the augmented off gas system (as determined at the end of the delay pipe), except iodines and particulates with half-lives larger than eight days, shall be limited in accordance with the following equation:

$$Q = \frac{.21}{\overline{E}} \text{ Ci/sec}$$

where Q = release rate in Ci/sec determined for the end of the delay pipe, and

$\overline{E}$ = average gamma energy in Mev/disintegration.

QUESTION

3. We find the proposed modifications for a non-seismic gaseous radioactive waste system is acceptable provided that you provide assurance that the off gas system can be reliably isolated within 10 minutes of a failure in the system.

RESPONSE

Noncondensible gases are removed from the three main condensers through six 10 inch air ejector lines. Each line has an isolation valve which is automatically closed by explosion detectors in the offgas system. The explosion detectors are two temperature and two pressure switches located in the offgas holdup pipe near the steam jet air ejector.

Automatic isolation of the three main condensers will only occur under the following conditions:

1. Detection of high temperature by both the high temperature switches or

2. Detection of high pressure by both the high pressure switches or

3. Detection by one high temperature and by one high pressure switch.

Detection of high temperature or high pressure by any one switch will annunciate in the control room but will not isolate the main condensers.

In addition to the automatic isolation of the three main condensers, the isolation valves may also be closed from remote manual switches from the main control room or from a local valve control switch.

Besides isolation at the main condenser, isolation capability exists for each of the redundant augmented offgas (AOG) system trains.

The AOG system to be installed at the end of the existing delay line will consist of the following equipment:

1. Recombiner subsystem consisting of the following redundant components: preheater, blower, catalytic recombiner and recombiner cooler.

2. Water Removal Subsystem consisting of redundant condensers, chillers and freeze-out heat exchangers.

3. Charcoal Tanks.

4. HEPA Filter.

An isolation valve is located upstream of each redundant recombiner subsystem and an AOG system bypass valve is located in the base of the stack at the end of the existing delay line. These valves are semiautomatic, air operated. The isolation valves automatically close and the bypass valve automatically opens to isolate the AOG System under the following circumstances:

1. Low flow in air recirculation line around the recombiner cooler unit.

2. High temperature in the exit stream from the recombiner.

3. High hydrogen level in the exit stream from the recombiner.

The isolation valves are designed to fail closed if either air or electrical operating power are lost.

In addition to the above mentioned automatic isolation features, provision will be made in the main control room for the following annunciations, controls and indications:

1. Annunciation of high radiation level in AOG building area.

2. Annunciation of high radiation level in AOG building ventilation exhaust.

3. Annunciation of AOG system trouble via one annunciator point.

4. Ability to manually isolate the AOG system via one pushbutton.

5. Annunciator indicating both AOG isolation valves are closed.

6. Low offgas flow annunciator.

The control room operator, by procedure, will be required to isolate the system within 10 minutes of receipt of either high building area radiation annunciation or high building ventilation exhaust radiation annunciation. These high radiation annunciators are indicative of an AOG System component failure. "System Trouble" annunciation indicates that one of the above mentioned abnormal conditions exists and the system requires attention.

The "Low Offgas Flow" annunciator on the AOG Panel in the main control room is provided to indicate the occurrence of a break in the delay line or a break in the 4" line carrying the Offgas to the AOG System. The "Low Offgas Flow" annunciator will annunciate only if the flow measured at the inlet of the Recombiner Subsystem in the AOG building is much less than the flow anticipated at the minimum operating power level. Upon receipt of such an annunciation the operator, by procedure, will isolate the three main condensers within 10 minutes using remote manual switches located in the main control room.

QUESTION

4. We find the proposed modifications for a non-seismic gaseous radioactive waste system is acceptable provided that you provide assurance that the delay time for noble gases passing through the delay pipe is not less than 60 minutes.

RESPONSE

The design of the off-gas delay pipe is based on providing a 30 minute delay of the gases to provide time for short-lived isotopes to decay before release. This assumes normal in-leakage to the main condensers. If the leakage to the main condensers can be reduced the off-gas flow rate will be reduced and the holdup time increased. This reduces the radioactivity discharged to the atmosphere and therefore, the doses due to normal operations.

Continuous efforts at Oyster Creek to reduce condenser in-leakage have resulted in nominal delay times of 60 minutes, thus reducing gaseous radioactive discharges. However assurances can not be given that a 60 minute holdup time can be maintained in a system designed for 30 minutes. However, the augmented off-gas system provides greatly increased delay of noble gases before they are discharged and therefore under normal operating conditions the delay in the pipe will not be significant.

The analysis of a rupture in the delay pipe shows that the contents of the delay pipe and the gases which enter it before isolation of the steam jet air ejectors [illegible] atmosphere. The longer the delay time, the greater is the noble gas inventory which is available for release. Isolation of the air ejectors is accomplished within 10 minutes of the rupture of the delay pipe system so that the dose attributable to the noble gas inventory available in the pipe is greater than that attributable to the gases that flow into the pipe after the break. Therefore, it can be seen that reducing delay time reduces the noble gas inventory available for release (and therefore the doses resulting from the release of that inventory). A 60 minute delay assumption in this accident analysis conservatively covers the most probable situation, i.e., delay time less than or equal to 60 minutes.