UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

April 3, 1973

Docket No. 50-219

Jersey Central Power and Light Company
ATTN: R. H. Sims, Vice President
Madison Avenue at Punch Bowl Road
Morristown, New Jersey 07960

Gentlemen:

To assure that any significant release of fission products is retained within the containment system in the event of a design basis accident such as a loss-of-coolant accident, isolation valves have been installed in the main steam line of boiling water reactors (BWR). To achieve high reliability of containment isolation, two valves are installed in series in each steam line. Proper closure of either of the two valves will prevent release of fission products by this route from exceeding 10 CFR 100 guidelines in the event of an accident. To achieve the required high reliability, it is necessary that each valve have a high reliability.

A review of the reliability to close on demand of the main steam isolation valves (MSIVs) for the larger BWRs has been conducted. It is concluded that supplemental action is required to improve the reliability of the MSIVs to close on demand.

A summary of the failures of the MSIVs is included in Attachment A. Experience at the four older BWRs is not included because of the significant differences in valve configuration. A review of the sixteen reported failures to close shows that in all cases, except one, the failures were caused by a sticking pilot valve in the MSIV pneumatic control system. Events have also been reported of slow MSIV closure and malfunctions during exercising which have been caused by sticking pilot valves. It is our understanding that the sticking pilot valves are all of the same design and provided by one vendor. Based on the reported experience, correction of the cause of pilot valve sticking should be a first priority item in improving MSIV closure reliability.

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Corrective action has been taken at some reactors to eliminate some of the causes of pilot valve failure. During 1970 and early 1971, Dresden 2 sustained nine occurrences of MSIV failure to close. The corrective actions taken at Dresden 2 and 3 are described in detail in Attachment B. In summary the following actions were implemented:

1. The clearances between the piston and the cylinder walls of the pilot valve were increased.

2. The operating gas was changed from air to nitrogen on both the inboard and outboard valves to compensate for the higher leakage of gas into the drywell caused by item 1. Changes were made in the gas handling system to improve gas quality. The pilot valve temperature environment was found to be in excess of the design temperature and was corrected.

In addition, a change was made at Dresden 2 and 3 to the MSIV slow closure system such that the fast closure pilot was exercised during each twice-weekly exercising of the MSIVs. In the two-year interval since the above changes, no failures of the MSIVs to close have been reported.

Based on information provided by telephone, all but one of the large operating BWRs have pistons in the pilot valve with increased clearances, and all but two have converted the operating gas, on at least the inboard valves, to nitrogen. It may be noteworthy that all four of the most recent failures were of outboard valves which were operated by air.

We conclude from the experience to date that poor quality operating gas is the most probable cause of most of the MSIV failures to close. A temperature environment higher than the design rating of the pilot valve cannot be eliminated as a possible contributing cause. Based on the experience to date, we conclude that design improvements to eliminate pilot valve sticking are necessary at most BWRs to assure that MSIV valve closure reliability is improved to the level required by the safety function of this equipment.

It is requested that you provide a description of any changes planned for your reactor to upgrade the reliability of MSIV closure. If no changes are planned, provide a discussion of the features of your system which you believe causes it to be more reliable than is indicated by the general experience of Attachment A.

To aid in our current and future evaluation of MSIV performance, the following information is requested:

a. The minimum clearance between the pilot valve piston and the pilot valve cylinder.

b. The specifications for the cleanliness of the MSIV operating gas(es), a description of the means for achieving these specifications including the particle size rating of particulate filters, and the means used to monitor that the specifications are being achieved.

c. The temperature environment of the MSIV pilot valves.

d. A description of the preventive maintenance program for the MSIV pneumatic control system.

The above information is requested in 90 days and should be submitted as 1 original and 39 additional copies.

Sincerely,

Donald J. Skovholt
Assistant Director
for Operating Reactors
Directorate of Licensing

Enclosure:
1. Attachment A - MSIV Failure-To-Close Experience
2. Attachment B - Corrective Actions to Assure MSIV Operability

cc: GPU Service Corporation
ATTN: Mr. Thomas M. Crimmings, Jr.
Safety and Licensing Manager
260 Cherry Hill Road
Parsipanny, New Jersey 07054

G. F. Trowbridge, Esquire
Shaw, Pittman, Potts, Trowbridge & Madden
910 - 17th Street, N. W.
Washington, D. C. 20006

Ocean County Library
15 Hooper Avenue
Toms River, New Jersey 0875

ATTACHMENT A

MAIN STEAM ISOLATION VALVE FAILURE-TO-CLOSE EXPERIENCE

Date	Reactor	Number of Failures	Component Failure
5/8/70	Dresden 2	4	Pilot valves
12/4/70	Dresden 2	4	Pilot valves
1/22/71	Dresden 2	1	Pilot valve
8/1/71	Millstone I	1	Pilot valve
11/16/71	Oyster Creek	1	Dash pot
5/13/72	Monticello	1	Pilot valve
11/15/72	Quad-Cities I	1	Pilot valve
11/29/72	Pilgrim	1	Pilot valve
12/3/72	Oyster Creek	1	Pilot valve
12/29/72	Oyster Creek	1	Pilot valve

ATTACHMENT B

REPORT NO. 7

CORRECTIVE ACTIONS TO ASSURE MAIN STEAM LINE ISOLATION VALVE OPERABILITY

March 17, 1971

Commonwealth Edison Company

REPORT NO. 7

COMMENT

A detailed report of corrective actions taken to assure main steam line isolation valve operability.

RESPONSE

Background

On several occasions between April 30, 1970 and February 1, 1971 the main steam isolation valves (MSLIV's) installed in the Dresden 2 Nuclear Power Plant failed to operate due to sticking of the pneumatic valves which control the flow of air to a cylinder operator to open and close the MSLIV's.

The pneumatic valves in use during April and May 1970 had small clearances and were highly sensitive to contaminated air and excessive heat. Test thermocouples installed on the outside of the pneumatic valve housings showed that in operation the valves installed in the drywell reached approximately 129°F and valves in the steam tunnel reached 175°F. Inspection of the valves showed the lands of the spools were significantly discolored and coated with a varnish-like substance. All spools were very sticky in the sleeve. When the spools were washed in solvent and cleaned up, they freed up considerably, but not as free as manufacturer representatives recommended for a normal spool and sleeve. Therefore, it was concluded that two problems were being encountered. First, there was contamination getting into the valve in sufficient quantity to cause the spools and sleeves to stick and bind. In addition, some of the spools and sleeves were binding mechanically because of the heat. Either one of the two problems would render a valve of the type used at that time inoperative. As discussed in the Special Report on the June 5 incident, Supplementary Information, steps were taken to replace all the pneumatic valves with higher clearance type valves and also additional air conditioning equipment was added to the steam tunnel to reduce temperatures in the area of the valves.

In early December 1970 four main steam isolation valves failed to close and one closed out of tolerance during a schedule surveillance test. Upon inspection of the pilot valves the same sort of contamination on the spool caused the sticking. The source of the contamination has been traced to the air supply compressors. These are oil lubricated compressors. After a significant period of operation the oil leaks into the air supply.

Corrective Action

The following corrective actions will be taken to eliminate the MSLIV actuation problems:

1. The clearance between the sleeve and spool has been increased and additional air cooling has been installed in the steam tunnel to eliminate binding caused by high temperature.

2. The instrument air system for both Dresden 2 and 3 has been thoroughly cleaned to avoid entrainment of dirt and oil.

3. Three different plans of action are being undertaken to ensure oil and other contamination are not introduced back into the MSLIV pneumatic supply.

   a. The valves inside the drywell will take their supply from a pumpback system. This system consists of two air compressors, filters, separator and dryer, a 250 gallon receiver, and associated piping, valves, controls and instrumentation. The drywell pneumatic supply system takes suction from the drywell atmosphere, compresses and cleans the gas and stores it in the 250 gallon receiver at a nominal 100 psig. The receiver discharges to the equipment in the drywell which require motive gas. This system provides a source of clean gas for use in all pneumatic equipment thus limiting the effects of dirt and oil on the operation of MSLIV's. This system is being installed during the current outage. The system will be connected to the presently installed pneumatic system to supply all the equipment within the drywell requiring motive gas. The back up supply is nitrogen from the Drywell Atmosphere Make-Up System. A copy of the P&ID for the Drywell Pneumatic Supply System is attached.

   b. As an interim solution the MSLIV valves located inside the steam tunnel will take their motive supply from four liquid nitrogen storage tanks. The liquid nitrogen system provides a constant regulated pressure of 115 psig to the supply system. The system is capable of continuous delivery of 800 scfh or 1850 scfh for short periods at pressures up to 150 psig. Each station comprises of: 1) filter, 2) a fin air vaporizer, 3) console with controls, 4) appropriate valves and pressure regulator, 5) liquid nitrogen tanks each having 3650 scfh capacity, and 6) pressure switch and low pressure annunciator in the control room.

REPORT NO. 7

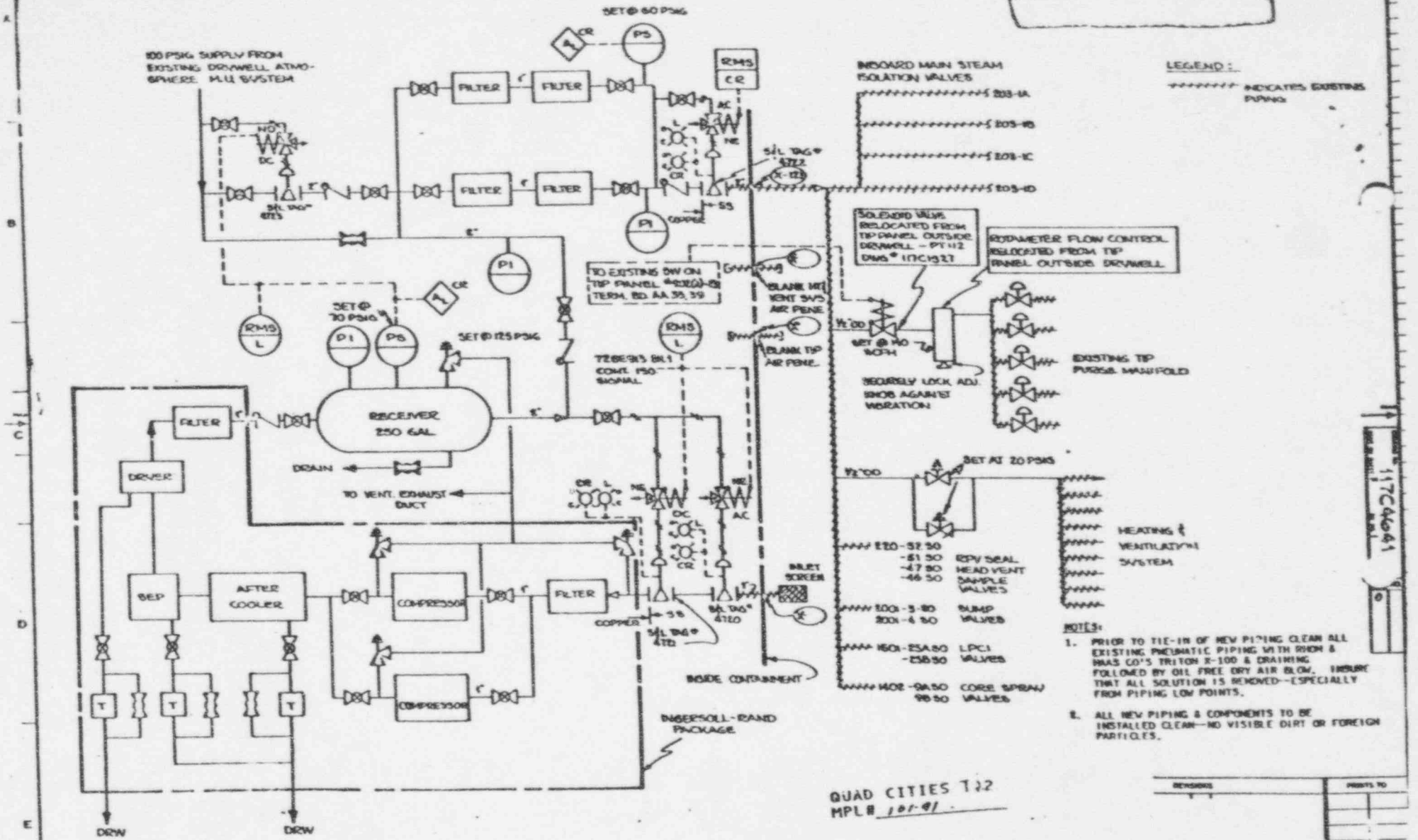
This system will be replaced by an oil-free non-lubricated compressor. The instrument air will be separated from the service air compressors and two non-lubricated compressors, redundant filters, dryers, air receivers, installed into the instrument air supply to form a completely separated oil-free system. The Dresden 2 and 3 instrument air supplies will be identical and "cross-tied" to provide redundant systems for both plants (each system has the capacity to supply both units). As the source of oil was being introduced into the system by the oil lubricated compressor, the installation of the new compressors will eliminate the source of contamination.

It is concluded that the corrective action described above will eliminate any further MSLIV problems. This conclusion is substantiated by the number of BWR's in operation with this type of valve without any actuator problems. The only difference between the successfully operating valves in these BWR's and Dresden is the air supply system.

After the completion of the corrective action described above, the plant will return to a normal technical specification surveillance program.

GENERAL ELECTRIC 117C4641

DRYWELL PNEUMATIC SUPPLY SYS



NOTES:

1. PRIOR TO TIE-IN OF NEW PIPING CLEAN ALL EXISTING PNEUMATIC PIPING WITH RHOM & HAAS CO'S TRITON X-100 & DRAINING FOLLOWED BY OIL FREE DRY AIR BLOW. INSURE THAT ALL SOLUTION IS REMOVED--ESPECIALLY FROM PIPING LOW POINTS.
2. ALL NEW PIPING & COMPONENTS TO BE INSTALLED CLEAN—NO VISIBLE DIRT OR FOREIGN PARTICLES.

QUAD CITIES 1 & 2
MPL # 101-01

APPD SAN JOSE, CALIF.

117C4641

Jersey Central Power & Light Company

MADISON AVENUE AT PUNCH BOWL ROAD • MORRISTOWN, N.J. 07960 • 539-6111

April 3, 1973

Mr. F. E. Kreusi, Director
Directorate of Regulatory Operations
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Kreusi:

Subject: Oyster Creek Station
Docket No. 50-219
Quarterly Personnel Exposures

The purpose of this letter is to advise you that two employees assigned to the Oyster Creek Station have possibly received whole-body exposures in excess of 3 rems during the first quarterly period of 1973. This report is being submitted in accordance with 10CFR20.405.

In the interest of being conservative, this exposure is being reported as whole-body exposure at this time. The extent of the exposure range from 3.140 rem to 3.290 rem based upon film badge results. The exposure of each individual by name is listed in Attachment A to this letter. Each individual has been given notification of his exposure.

The exact cause of the overexposure cannot be determined with any degree of certainty since in each case the violations were discovered upon receipt of film badge results which are analyzed monthly. Each individual had been engaged in various activities throughout the month, therefore, no direct correlation can be made. It bears mentioning, however, that as a general rule, neither of the individuals would have worked at their jobs in radiation fields for any length of time without at least one other individual being present, either assisting him or working with him in some manner. Thus, it would be expected that more than one individual would be exposed to the same radiation intensity. Yet, in the case of the excessive beta exposure, no other individual received any exposure to beta radiation during the period of time in question. In the case of the second individual, the discrepancy between the film badge results and self-reading pocket dosimeters was nearly twice as large as that noted for other individuals.

The reported exposure provided by our film badge service is currently under investigation by an outside consultant. Results of the investigation should be available within sixty days.

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Further strengthening of our personnel exposure accumulation is indicated by this event. More frequent film badge exposure data will be collected in the future as an individual approaches quarterly whole-body exposure limit as follows:

Accumulated Quarterly Exposure Range	Film Badge Reading Frequency
0-1.000 R	Monthly
1.000-1.750 R	Semimonthly
1.750-2.500 R	Weekly
2.500-3.000 R	Daily

It is believed such practice will prevent further minor overexposures similar to those that have been reported to your office over the past year.

Very truly yours,

Donald A. Ross

Donald A. Ross
Manager, Nuclear Generating Stations

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Attachment

cc: Mr. J. P. O'Reilly
Mr. S. W. Porter

Jersey Central Power & Light Company

MADISON AVENUE AT PUNCH BOWL ROAD • MORRISTOWN, N.J. 07960 • 539-6111

April 3, 1973

Mr. Frank E. Kreusi, Director
Directorate of Regulatory Operations
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Kreusi:

Subject: Oyster Creek Station
Docket No. 50-219
Additional Information/Personnel Overexposures

This letter is in response to your January 31, 1973 letter to Mr. Ivan R. Finfrock, Jr. requesting additional information regarding the results of our investigation into the overexposures reported to your office by letter dated August 10, 1972.

The special General Office Review Board investigation determined the major factors leading to this incident were the unexpectedly high radiation levels encountered and the unanticipated repair work associated with the plant shutdown. The incident resulted from the desire of some personnel involved to insure that the work required was properly performed to insure satisfactory performance of the plant and from the lack of a specifically defined and enforced radiation exposure limit (below the allowable level) at which the men should not have been permitted to work in radiation areas except under very close control.

The action taken to prevent similar exposures from reoccurring were as follows:

1. No person will be permitted to incur doses in excess of 2500 mrem whole body per calendar quarter without written authorization from the Manager, Nuclear Generating Stations. Persons so authorized will be subject to special control while accumulating any additional exposure.

2. A daily report, current as of the previous day, will be issued by the radiation protection group at Oyster Creek showing accumulative quarterly exposure of all personnel for which such exposure exceeds 1.25 rem whole body. The report will be distributed to all foremen, supervisors, the station superintendent, and the Manager, Nuclear Generating Stations. It contain's the man's name, position, and controlling record of exposure. Station operating procedures have been changed to reflect all of the above items.

Very truly yours,

Donald A. Ross

Donald A. Ross
Manager, Nuclear Generating Stations

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cc: Mr. James P. O'Reilly
Mr. S. W. Porter

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