BALTIMORE
GAS AND
ELECTRIC

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ARTHUR E. LUNDVALL, JR.
VICE PRESIDENT
SUPPLY

March 22, 1984

U. S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

ATTENTION: Mr. Thomas E. Murley
Regional Administrator

Subject: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
IE Bulletin 83-07; Apparently Fraudulent Products
Sold by Ray Miller, Inc.

Gentlemen:

This refers to IE Bulletin 83-07, which requested information on apparently fraudulent products sold by Ray Miller, Inc. The enclosure, attachment and accompanying table provides our response to items 1 through 4 as requested in the Bulletin.

Should you have further questions regarding this reply, we will be pleased to discuss them with you.

Very truly yours,

Arthur E. Lundvall, Jr.

STATE OF MARYLAND:
: TO WIT:
CITY OF BALTIMORE:

Arthur E. Lundvall, Jr., being duly sworn states that he is Vice President of the Baltimore Gas and Electric Company, a corporation of the State of Maryland; that he provides the foregoing response for the purpose therein set forth; that the statements made are true and correct to the best of his knowledge, information, and belief; and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal:

Minnie L. Johnson
Notary Public

My Commission Expires:

July 1, 1986

IE11

cc: J. A. Biddison, Esquire
G. F. Trowbridge, Esquire
Mr. D. H. Jaffe, NRC
Mr. R. E. Architzel, NRC

ENCLOSURE 1

REPLY TO INSPECTION AND ENFORCEMENT BULLETIN 83-07

ITEM NO. 1

NRC REQUEST - Based on a review of the IEB 83-07 Lists of Ray Miller, Inc. customers who received apparently fraudulent materials (Attachments 1 and 2), and pertinent information obtained from any of these companies, either directly or indirectly:

(a) Identify those companies on the lists that supplied materials or services to your facility and are listed on Attachments 1 and 2 of IEB 83-07.

BG&E Response - Attachment 1 represents a list of companies that have supplied materials or services to our facility and are listed on Attachments 1 and 2 of IEB 83-07.

(b) Determine whether any of the apparently fraudulent Ray Miller, Inc. materials were provided to or used at your facility.

BG&E Response - Table 1 provides a description of material supplied by Ray Miller, Inc. and installed in safety-related and non safety-related systems at our facility.

(c) Determine whether any of the apparently fraudulent material supplied to you was installed in safety-related systems at your facility, or is still in stock.

BG&E Response - Table 1 provides a segregated list of safety-related and non safety-related systems (with component descriptions) containing Ray Miller, Inc. supplied materials. We currently do not stock any material supplied by Ray Miller, Inc.

(d) If other Ray Miller, Inc. materials not listed in Attachments 1 and 2 of IEB 83-07 have been identified by your own initiative, determine whether any was installed in safety-related systems at your facility, or is still in stock.

BG&E Response - Footnote (1) on Table 1 designates materials supplied by Ray Miller, Inc. and used in safety-related systems at our facility that have been identified by our own initiative. We currently do not stock any materials (identified by our own initiative) supplied by Ray Miller, Inc.

ITEM NO. 2

NRC REQUEST - For Ray Miller, Inc. materials, both the NRC - identified apparently fraudulent materials listed in Attachments 1 and 2 of IEB 83-07, and other materials identifed by your own initiative, that are installed in safety-related systems of your facility:

(a) Evaluate the safety significance of the presence of these materials assuming the fraud is as identified in the attachments (to IEB 83-07) or assuming material failure.

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BG&E Response - The following evaluations are provided which consider the safety significance of failure of materials supplied by Ray Miller, Inc. that are used in safety-related systems at our facility. Failure of the identified materials is based on the following fraud codes supplied in the Bulletin:

- welded for seamless substitutions
- carbon content (std. grades of stainless steel for low carbon or in some cases low carbon for std.)
- foreign-made for domestic-made substitutions
- forming for machining substitutions
- pressure rating substitutions
- all other, e.g., 304SS for 316SS substitutions

Considering the above fraud codes and the application of the identified materials, the worst case failure is assumed to be a loss of material integrity (i.e., cracking, excessive wear, etc.) resulting from improper code classification (misrepresentation), stress or general corrosion mechanisms (due to material incompatibility, etc) or improper manufacturing processes.

SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM

Table 1 identifies the use of the following apparently fraudulent materials in the demineralizer (ion exchanger) for the Spent Fuel Pool (SFP) cooling and purification system:

- 3/4" socket weld half coupling, (3000#, 304SS). This coupling provides a means of attaching an external vent line to the pressure vessel of the SFP demineralizer. This coupling is a part of the pressure boundary for the vessel.

- 1" slip-on flange, (150#, raised face, 304SS). This flange provides a means of connecting internal spray header piping for the demineralizer. This flange is an internal part that is not a part of the vessel pressure boundary.

SYSTEM DESCRIPTION

The primary purpose of the SFP cooling and purification system is to remove decay heat from the spent fuel stored in the pools it serves and to maintain the clarity and low activity level of the water in the SFP, the reactor cavity refueling pools and the refueling water tanks. A mixed bed non-regenerable demineralizer processes approximately 120 gpm of cooled, diverted water from the SFP cooling system for the purpose of purification.

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The design purpose of the SFP filter/demineralizer is to remove fission products from the cooling water in the event of a leaking fuel assembly. The SFP demineralizer can be aligned with the refueling water tanks or the reactor cavity refueling pool to provide purification.

EVALUATION OF CONSEQUENCES

The worst case material failure resulting from events initiated as a result of the postulated fraud codes listed previously could produce a breech of the pressure boundary of the SFP demineralizer. Assuming a complete separation of the vent pipe from the 3/4" coupling (3/4" coupling is assumed to remain on the tank) a worst case leak rate of $\leq$ 121 gpm could be expected based on a maximum normal operating pressure of 140 psig for the SFP cooling system.

The result of such a failure would present an airborne and liquid spill radiological hazard in the areas adjacent to the demineralizer which is located on the 27' elevation of the auxiliary building in an infrequently occupied zone.

The Final Safety Analysis Report (FSAR) postulates the worst case failure in the system to be a loss of water inventory in the spent fuel pool. Under the maximum postulated heat load assumed in the FSAR a complete loss of SFP cooling will result in a temperature rise from 155°F to 210°F in 15.5 hours. The following design features are available to mitigate the consequences of such an event:

- Two SFP cooling pumps that provide flow for the cooling and purification system take a normal suction from standpipes located in the SFP. The location of each standpipe is such that a leak in the SFP cooling/purification system would not result in a complete loss of water inventory in the spent fuel pool, i.e. the pumps would loose net positive suction head before the spent fuel pool would be significantly drained. Any loss of pool inventory would not exceed the minimum level of water necessary for shielding to maintain radiation dose levels less than approximately 1 mr/hr at the pool surface if a fuel bundle were raised the maximum height allowed by the Spent Fuel Handling machine during refueling operations.

- Any liquid spilled from such a leak would be directed to auxiliary building area drains which in turn are collected in the miscellaneous waste receiving system and processed via the radioactive liquid waste processing system.

- The ventilation system serving areas adjacent to the SFP demineralizer contains HEPA filters, the effluent is monitored (with alarms in the Control Room) and exhausts to the plant vent which also monitors plant ventilation effluents.

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- Makeup water can be supplied indefinitely to the spent fuel pool at a rate of at least 160 gpm. It can usually be supplied at a greater rate for a period of many days, but this depends upon plant conditions. Alternate sources of water are available (other than the normal source from the well water system via the makeup demineralizer system) in an emergency basis. These include the Demineralized Water Storage Tank capacity (350,000 gallons), and two Refueling Water Tanks (RWTs) with a single capacity of 420,000 gallons each (Technical Specifications require a minimum inventory in each RWT of 400,000 gallons to support accident analysis during operating modes).

  A failure of the internal 1" flange associated with the demineralizer distribution header would most likely result in the decreased efficiency of the resin bed. The distribution header containing the flange is provided by design to prevent channeling of the resin bed during operation. Due to the mechanical filtration quality of the resin bed and the demineralizer outlet mechanical filter (which prevents carryover of resin beads into the demineralizer effluent) it is highly improbable that the consequences of a flange failure would result in a radiological problem or significant flow blockage through the demineralizer. The safety implications of such a failure are therefore minimal.

Detection of a failure of the 3/4" coupling would normally be accomplished with the aid of the following indications which either provide a common annunciator or annunciate directly in the Control Room:

- Miscellaneous Waste Receiver Tank high level alarm (leakage from the demineralizer would be directed via auxiliary building drains to this tank).
- SFP pump low discharge pressure alarm
- SFP Demineralizer flow low alarm
- Refueling Water Tank low level alarm
- Spent Fuel Pool low level alarm
- Spent Fuel Pool area radiation alarm
- SFP cooling heat exchanger room area radiation alarm
- Auxiliary Building ventilation system radiation alarm

In addition to the above alarms that annunicate in the Control Room, the following indications in the Control Room would provide evidence of a system rupture if purification was aligned to either of the following:

- Refueling Pool level indication
- Refueling Water Tank level indication

During normal operation positive actions can be taken within assumed operator response times of approximately 15 minutes from remote locations (not immediately adjacent to the source of the leak) to secure a leak on the demineralizer.

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CONTAINMENT STRUCTURE EMERGENCY ESCAPE HATCH

Table 1 identifies the use of the following apparently fraudulent materials in the Emergency Escape Hatch (EEH) equalizing vent header:

- 2" 90° weld elbow, (Sch. 80, 304SS). This elbow provides a means of attaching a 2" Jamesbury ball (equalizing isolation) valve to the containment side EEH pressure boundary. This elbow is a part of the pressure boundary for the containment.

- 2" slip-on flange, (150# raised face, 304SS). These flanges provide a means of attaching the equalizing isolation valve to the 90° elbow and the 90° elbow and piping to the EEH pressure boundary. These flanges are a part of the pressure boundary for the containment.

SYSTEM DESCRIPTION

The primary purpose of the EEH equalizing vent headers are to equalize containment ambient pressure with the EEH air lock and equalize the EEH air lock with atmospheric pressure. This system is infrequently used for personnel entry/exit to and from the containment during emergency or abnormal situations without creating a direct path from the containment to the outside environment. The system consists of two vent headers, one between the containment and the EEH air lock and a second header between the EEH air lock and outside. A 2" ball valve operated by the EEH door linkage isolates each equalizing header.

EVALUATION OF CONSEQUENCES

The worst case material failure resulting from events initiated as a result of the postulated fraud codes listed previously could produce a breech of the containment pressure boundary. Two simultaneous failures would be required to produce an unmonitored leak path from the containment to atmosphere.

(b) Determine the disposition of the installed material; e.g., use as is, remove and replace, etc.

SPENT FUEL POOL COOLING AND PURIFICATION SYSTEM

BG&E Response - Based on the results of our evaluation of the consequences of material failure we have determined that the installed materials in question are acceptable to "use as is". This determination is supported by the following justification.

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SAFETY EVALUATION

The SFP demineralizer system supplied by Richmond Engineering Co., Inc. was factory tested to a hydrostatic pressure of 351 psig prior to site delivery. (The system normally operates at a pressure of no greater than approximately 140 psig).

Failure of the pressure boundary connection would not result in an unmonitored offsite dose release and all radiological liquid spilled would be processed by the radioactive liquid waste processing system.

The maximum postulated leak rate is less than the makeup capacity of the SFP cooling system, therefore, the probability of a loss of SFP water inventory is minimized by installed design features. Inspection and/or replacement of suspect fittings is impractical and inconsistent with the ALARA program due to the high dose rates associated with the SFP demineralizer.

CONTAINMENT STRUCTURE EMERGENCY ESCAPE HATCH

BG&E Response - Based on subsequent investigations we have performed on the system and materials (Unit 1 only) in question we have determined that the installed materials are acceptable to "use as is". This determination is supported by the following justification.

SAFETY EVALUATION

The most limiting component from a material failure susceptability standpoint (of those materials identified) are the 90^{o} elbows. This is due to the inherent stress concentrations associated with short radius bend piping components. Examinations performed on each suspect elbow for Unit 1 determined the wall thickness to be ≥ 0.158 inches. This measurement corresponds to the normal wall thickness of Schedule 40 fittings of this type. Standard Schedule 40 fittings subject to the postulated worst case temperature for the service application used (in this case peak temperatures following a Loss of Coolent Accident-LOCA) have a design pressure rating in the accident pressure direction of greater than 50 times that expected under worst case (FSAR, Chapter 14) accident conditions. Examinations have been performed by In Service Inspection (ISI) Inspectors on all suspect materials. These exams included a visual inspection for cracks and other indications, a typical wall thickness measurement on the 90^{o} elbows and a gross determination of material type, i.e. ferromagnetic versus non-ferromagnetic. These examinations yielded acceptable results.

We have reviewed the results of full design pressure tests to determine if any failures have been identified in the past at our facility. These reviews consisted of the following:

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Integrated Leak Rate Test (ILRT)

Both Calvert Cliffs Units have undergone three (each) full pressurization ILRTs. System design and ILRT boundaries are such that during an ILRT the inboard (containment to air lock) equalizing vent header is subject to full design pressure. This is not true for the outboard (air lock to outside) equalizing vent header, which remains essentially at ambient (atmospheric) conditions. Under ILRT test conditions the inboard equalizing vent header is tested in the accident pressure direction. The results of all ILRTs performed to date on each Unit indicate no detectable leakage from the inboard equalizing vent header.

Local Leak Rate Test (LLRT)

The most recent two years[2] of data was reviewed of full design pressure LLRT results. System design and LLRT boundaries are such that during a LLRT the inboard equalizing vent header is subject to full design pressure in a direction opposite to the accident pressure direction and the outboard equalizing vent header is subject to full design pressure in the accident pressure direction. The results of all LLRTs performed for the most recent two year period indicate acceptable results for the materials in question.

Although ISI inspections of Unit 2 have not been performed to date, Unit 2 is scheduled for a Spring 1984, Refueling outage. Inspection of the suspect Unit 2 EEH components has been scheduled into the ISI workload.

Based on these results and considering the low probability of both equalizing vent headers failing simultaneously, we feel that our decision to rely on presently installed materials is appropriate.

As you are aware, our Technical Specifications specify the performance of periodic surveillance tests (e.g., ILRT & LLRT) to ensure that the containment pressure boundary remains functional throughout the life of the facility. The current surveillance methods and frequencies are adequate to detect any degradation in the suspect materials.

ITEM NO. 3

This item is not applicable to our facility. As supported by our response to Item No. 2, we currently do not stock any Ray Miller, Inc. supplied materials.

[2] This data represents approximately 15% of all data and is the most representative since it demonstrates operability for the period of greatest inservice duration.

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We are providing the below information to assist the NRC in evaluating the cost of this Bulletin.

1. Staff time to perform review and testing:

   Approximately 10 hours at a rate of $29/HR

2. Staff time spent to prepare requested documentation:

   Approximately 62 hours at a rate of $29/HR
   Approximately 60 hours at a rate of $23/HR
   Approximately 314 hours at a rate of $12/HR

ATTACHMENT 1

REPLY TO INSPECTION AND ENFORCEMENT BULLETIN 83-07

Companies Supplying Materials and Services to Calvert Cliffs
That Are Listed On IEB 83-07, Attachments 1 and 2.

Air Preheater Co.

Armco Steel Corp.

Briggs Rubber Products Co.

Buffalo Forge Co.

C. E. Thurston Co.

Edward Engineering

Emerson Electric Co. (Brooks Instruments Division)

Goodall Rubber Co.

Grinnell Corp.

Hilliard Corp.

Ingersoll Camerson (Pump Division)

Keene Corp.

Keystone Tubular

Pittsburgh - Des Moines Steel Co.

PX Engineering

Richmond Engineering Co.

Union Carbide Corp.

U. S. Testing Co., Inc.

Westinghouse

Whiting Corp.

TABLE 1

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SAFETY-RELATED APPLICATIONS

SYSTEM/COMPONENT	ITEM DESCRIPTION	VENDOR	SUBVENDOR
Spent Fuel Pool Cooling and Purification System/Demineralizer	3/4" Socket Weld half couplings (3000# 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.
	1" Slip-on flanges (150#, raised face 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.
Containment Structure Emergency Escape Hatch Equalizing Vent Header[1]	2" 90° weld ells, (sch. 80, 304SS)	Chicago Bridge and Iron, Co.	Ray Miller, Inc.
	2" Slip-on flanges, (150#, raised face, 304SS)	Chicago Bridge and Iron, Co.	Ray Miller, Inc.

[1] Ray Miller supplied materials identified during documentation search and not indicated on Attachments 1 and 2 of IEB 83-07.

TABLE 1

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NON SAFETY-RELATED APPLICATIONS

SYSTEM/COMPONENT	ITEM DESCRIPTION	VENDOR	SUBVENDOR
Chemical and Volume Control System/ Purification and Deborating Ion Exchangers	3/4" Socket weld half couplings (3000#, 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.
	1" Slip-on flanges (150#, raised face, 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.
Reactor Coolant Waste System/Bleed Ion Exchangers	3/4" Socket weld half couplings (3000#, 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.
	1" Slip-on flanges, (150#, raised face, 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.
Miscellaneous Waste Processing System/ Ion Exchangers	3/4" Socket weld half couplings (3000#, 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.
	1" Slip-on flanges, (150#, raised face, 304SS)	Richmond Engineering Co., Inc.	Ray Miller, Inc.