

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-317/81-26

Docket No. 50-317

License No. DPR-53 Priority -- Category C

Licensee: Baltimore Gas and Electric Company

P.O. Box 1475

Baltimore, Maryland 21203

Facility Name: Calvert Cliffs Nuclear Power Plant, Unit 1

Investigation At: King of Prussia, Pennsylvania, Bridgeport, Connecticut,
and Lusby, Maryland

Investigation Conducted: June 25-26; July 6-7, 20-21, 27-29; August 13; October
27-30 and November 5-6, 1981

Investigators: R.E. Shepherd 12-23-81
R.E. Shepherd, Investigation Specialist date signed

R.A. McBrearty 12-21-81
R.A. McBrearty, Reactor Inspector date signed

Approved By: L.E. Tripp for 12/28/81
L.E. Tripp, Chief, Materials and Processes date signed
Section, DETI

Investigation Summary:

Investigation on June 25-26; July 6-7, 20-21, 27-29; August 13; October 27-30 and
November 5-6, 1981 (Report No. 50-317/81-26)

Areas Investigated: Investigation of allegations that the quality of the welds on the spent fuel storage racks at Calvert Cliffs Unit 1 was unacceptable because of poor inspection practices and the use of defective test equipment.

Results: Interviews with licensee personnel and examination of licensee records indicated that some unacceptable welds on the fuel racks were identified and repaired, and that the necessary corrective actions were taken. No items of noncompliance were identified.

I. SUMMARY

This investigation was initiated as a result of an anonymous telephone call to the NRC Region I Office on June 25, 1981. The caller, herein designated as Individual A, again contacted Region I on June 26 and discussed concerns which related to the spent fuel storage racks at Calvert Cliffs Unit 1. NRC Region I representatives D. Caphton, L. Tripp and R. Shepherd participated in these telephone conversations.

A meeting of Individual A and two NRC Region I representatives took place on July 6, 1981. Individual A said that the Calvert Cliffs Unit 1 high density fuel racks, purchased through a contract with Nuclear Energy Services, contained unacceptable welds, source inspections were superficial, and test equipment was used when it was not operating properly.

Based on information provided by Individual A, the NRC investigators conducted an investigation at the Calvert Cliffs Unit 1 facility. The investigation included interviews of licensee personnel and the examination of audit and inspection records associated with the fabrication and inspection of the Unit 1 spent fuel storage racks.

The investigation identified that the allegations were based on apparent incomplete information on the part of Individual A in that the unacceptable conditions reported to the NRC by Individual A were rectified and the necessary corrective actions were taken. The investigation did not identify any items of noncompliance with NRC regulatory requirements.

II. REASON FOR INVESTIGATION

The purpose of this investigation was to investigate allegations that the quality of the welds on the spent fuel storage racks at Calvert Cliffs, Unit 1 was unacceptable because of poor inspection practices and the use of defective test equipment.

III. BACKGROUND

On June 25, 1981, an anonymous telephone call was received by D. Caphton, NRC Region I. The caller, referred to hereinafter as Individual A, mentioned some non-specific allegations which he indicated the NRC should look into. The caller declined to identify himself by name but provided information concerning his background which established his identity during this investigation. His identity is being withheld at his request.

On June 26, Individual A again contacted Mr. Caphton anonymously. L.E. Tripp and R.E. Shepherd, NRC representatives, participated in this telephone conversation. Individual A said that one area of concern related to the spent fuel storage racks at Calvert Cliffs, Unit 1.

Other areas of concern mentioned by Individual A, and not related to the Calvert Cliffs facility, were transmitted to the NRC Region IV, Vendor

Inspection Branch (VIB) for follow-up. The VIB conducted an inspection at Nuclear Energy Services, Incorporated (NES), Danbury Connecticut during the week of October 19, 1981. The results of that inspection will be reported by Region IV in a subsequent inspection report (99900762/81-01).

Individual A agreed to meet on July 6, 1981 with R.E. Shepherd and R.A. McBrearty, two NRC Region I representatives, to discuss his concerns. The meeting took place on July 6, and Individual A discussed a number of potential problems with the Calvert Cliffs, Unit 1 spent fuel storage racks, but did not provide the detailed information requested by the NRC representatives.

The interview was terminated when Individual A left the room to attend to some matter, and then telephoned to say that he could not return. He agreed to continue the discussion by calling the NRC representatives at the Region I office on July 7, 1981. Subsequent telephone contacts with Individual A as described in Section IV of this report were unsuccessful in obtaining any additional information concerning his allegations.

IV. DETAILS

1. Interview of Individual A by NRC Investigators R.E. Shepherd and R.A. McBrearty at the Holiday Inn, Bridgeport, Connecticut on July 6, 1981

Individual A said that he was concerned about the quality of the TIG spot welds on the spent fuel storage racks fabricated by Metal Products Corporation (MPC) in Greenville, South Carolina, under contract to Nuclear Energy Services, Incorporated (NES), Danbury, Connecticut. He said that when NES personnel inspected the welds on the fuel racks at the MPC facility on several occasions during 1980, there was no evidence that they had been previously inspected by MPC. He said that gaps, voids and fit up problems indicated to him that the fuel racks had not been inspected and that the welds were unacceptable according to the ASME criteria, which he could not identify at the time of this interview. He said that written reports identifying the problems were submitted to the NES Quality Assurance (QA) Manager and that copies of the reports were passed on to Mr. Leo Dudek, an engineer employed by the licensee, Baltimore Gas and Electric Company (BG&E). He said that the first rack fabricated by MPC for Calvert Cliffs, Unit 1 was rejected because of the welds and because of other problems, and that fuel racks numbered 6, 7, 8 and 9, exhibited the same types of defects. He said that the tensile strength of the spot welds was measured by a "pull test." He said that the pull tests of the fuel rack welds were not acceptable, and that the pull test readings were erroneous. He said that the erroneous readings were evident "just by looking at the results." He said that welding continued even though "they" knew that "they" were using pull test equipment that was not operating properly. He said that after the NES QA Engineer identified the problem with the pull test results, MPC looked into the problem and performed the necessary maintenance on the equipment. He said that NES terminated

their resident quality control (QC) inspector at the MPC facility because the inspector was not doing a good job inspecting the fuel racks in that he was not identifying defects in the components before they were assembled.

The above interview was interrupted when Individual A left the room to attend to some matter and he indicated that he would return to resume the discussion. He called Mr. Shepherd on the telephone about 30 minutes later and said that he had to attend to an urgent family situation. He said that he preferred to continue the discussion by calling the NRC representatives at the Region I office on July 7.

2. Additional Contacts with Individual A

Individual A telephoned Region I on July 7 and spoke to Messrs. Capton, Shepherd and McBrearty. He said that he did not have much time to talk on the telephone, but he agreed to call again on July 8. He also agreed to meet on July 10 with Shepherd and McBrearty in Bridgeport, Connecticut. The call was terminated at Individual A's request and he did not afford the investigators enough time to obtain details regarding the information which he provided during previous contacts with him.

On July 8, Individual A telephoned Capton and Shepherd and said that he was pressed for time and would call back on July 13. When reminded of the proposed meeting with Shepherd and McBrearty on July 10, he said that he wanted to postpone the meeting until after the July 13 telephone call.

Individual A failed to contact the Region I office on July 13, 1981 as he had agreed to do. He was telephonically contacted by R.E. Shepherd on August 13, 1981, at which time he said that he had an urgent family matter to attend to and he told Shepherd that it would be better if Shepherd called him the following day. On August 14, 1981, Individual A telephoned Shepherd at the Region I office and he declined to accept Shepherd's invitation to meet with him at a mutually agreeable time and place to obtain details regarding the information which he had provided thus far. During the above telephone conversation, Individual A indicated that he did not have time to discuss the details of his allegations but made general comments to the effect that "...engineers and managers brought these things to his attention," and "just because. . . something . . . did not meet specifications (not further identified) doesn't mean that its faulty." He said that he did not want to be contacted at home and said that he would telephone Shepherd at Region I on September 8, in response to Shepherd's request that the discussion be continued at Individual A's earliest convenience. Individual A has failed to contact Region I since that date.

3. Interview of Mr. Leo F. Dudek, Engineer, Mr. Herbert Hoffman, Senior Engineer, and Ms. Mina C. Key, Engineer, by NRC Investigators R.E. Shepherd and R.A. McBrearty at the Calvert Cliffs Nuclear Power Plant

On July 28 and 29, 1981, Messrs. R.E. Shepherd and R.A. McBrearty interviewed separately the above named members of the Baltimore Gas and Electric Company (BG&E) Quality Assurance Department, Baltimore, Maryland. Their comments concerning each of the allegations which were reported to the NRC Region I by Individual A, are as follows:

Allegation No. 1

Individual A said that the TIG spot welds on the spent fuel storage racks for Calvert Cliffs, Unit 1 were unacceptable in that there were gaps, voids and fit up problems in the welds.

Comments by Licensee Personnel

Mr. L. Dudek said that there were no fit up problems with the spot welds. He said that the spot welding process involved placing sheets of metal together in layers so that no fit up was required. He said that Metal Products Corporation had a problem at first and that the problem was with fillet welding of the base plate on Rack No. 1 which was attributed to thermal distortion. He said that corrective repairs were made to that rack. He said that subsequent racks did not have the problem because the welding process was changed to incorporate an intermittent corner fillet weld in place of the fillet weld made all the way around. He said that he disagreed with the allegation in that there was not any fit up problem with the welds.

Mr. H. Hoffman said that the problem concerning the welds was identified by Mr. Dudek at the MPC facility and that Dudek reported the problem to the licensee.

Ms. M.C. Key said that she was aware of problems with the welds, mainly lack of fusion. She said that a problem was identified with a heat of steel not welding properly. The cause was not identified, but the material was found acceptable by an independent laboratory. She said that all problems were either corrected or methods were developed to assure weld quality and that ultrasonic examination of the welds was one of the methods used. She said that the examinations showed that the welds were acceptable.

Allegation No. 2

Individual A said that the gaps, voids and fit up problems indicated that MPC's inspections of the spent fuel storage racks were superficial.

Comments of Licensee Personnel

Mr. Dudek said that subsequent to the spot welding operation on a fuel rack, an MPC inspector would check the welds with a feeler gauge. He said that MPC discarded some of the single fuel rack cells because of "burn through" and other welding related problems. He said that, to

his knowledge, the NES resident QC inspector did not inspect the welds. Dudek said that the NES inspector's job was to see that MPC filled out their (MPC) inspection reports. He said that he (Dudek) and the NES QA Engineer conducted joint audits at the MPC facility at which time they would check to see that MPC's inspection and NDE records were in order and they would also look at the welding processes which were being used. He said that MPC may have failed to provide BG&E with all the information, such as dimensions and alignment, for Rack No. 2 and possibly Rack No. 3. He said that he and the NES QA representative inspected all of the fuel racks prior to their acceptance. He said that nonconformance reports (NCR's) for all of the racks were submitted by MPC to NES who in turn submitted them to the licensee.

Mr. H. Hoffman said that he had no first-hand information concerning the above allegation.

Ms. M.C. Key said that the above allegation is not true in that it was an oversight on the part of both BG&E and NES that they did not devise inspection methods for welds that were inaccessible to visual examination or to the use of a feeler gauge. She said that all of the problems which were identified in the NCR's were resolved with the exception of one related to Rack No. 7 which she is still carrying as an open item.

Investigators' Note: Individual A said that the management of the Calvert Cliffs facility received written reports from NES concerning the problem with the welds on the fuel racks, specifically with regard to Rack No. 2, and that the problem was later corrected.

Allegation No. 3

Individual A said that the fit ups, gaps and voids in the welds were unacceptable according to ASME criteria and that the first fuel rack fabricated by MPC for Calvert Cliffs, Unit 1 was completed around June 1980 and it was rejected because of welds and other problems.

Comments of Licensee Personnel

Mr. L. Dudek said that he does not know of any ASME criteria that were not complied with in the fabrication of the spent fuel storage racks and that this applies to any gaps or voids that may have resulted from the welding process and were later corrected. He said that it is true that Rack No. 1 was completed around June 1980, but he would have to see his records and review the "receipt packages" to determine the exact date. He said that the first attempt to weld the base plate on Rack No. 1 caused a problem, possibly because of too much heat from the welding process, resulting in thermal distortion of the plate. He said that this problem was later corrected, and that the fillet welds were sound, based on the joint inspections performed by the licensee and NES and based on his personal observation of the welds.

Mr. H. Hoffman said that he could not say whether the criteria were met or not. He said that he would have to discuss the matter with Mr. Dudek because any information that he would have about the allegation would have been based on his discussions with Dudek who had a more direct involvement with the criteria associated with the fuel rack project. He said that he does not recall the date when Rack No. 1 was completed. He said that there were some problems with the fuel racks, but that he does not recall anything specifically about Rack No. 1 and that he would have to refer to his records to see what the problems were with Rack No. 1.

Ms. M.C. Key said that the date, June 1980, when Rack No. 1 was completed, sounds about right because all of the fuel racks were supposed to be completed by that date. She said that she did not know why Rack No. 1 was rejected or if, in fact, it was Rack No. 1 that was rejected. She said that she remembers that there were racks which were rejected and any deficiencies were corrected.

Investigators' Note: Records which were examined by the investigators indicate that Rack serial number NES-001, was completed at the MPC facility near the end of August, 1980.

Allegation No. 4

Individual A said that the pull tests on the welds were not acceptable and the pull test readings were erroneous.

Comments of Licensee Personnel

Mr. L. Dudek said that the pull tests may not have been acceptable on the first set up of the welding machine because they may not have met the tensile strength requirement. He said that pull tests were used to attain the proper adjustment of the welding machine. He said that the MPS procedure provided minimum tensile strength requirements which had to be met before production welding could be started, and that the welding machine controls would be adjusted until the required number of consecutive acceptable tests were conducted.

Mr. H. Hoffman said that he had no first-hand information concerning the above allegation, but that he had discussed pull tests with Mr. Dudek and that the discussion with Dudek indicated that the pull tests were successful. He said that he does not know if there had been any other tests that failed.

Ms. M.C. Key said that the only information that she had concerning the pull tests was obtained during her discussions with Mr. Dudek.

Allegation No. 5

Individual A said "you could tell that the pull test readings were erroneous just by looking at the results."

Comments of Licensee Personnel

Mr. L. Dudek said that he does not agree with the above allegation because he had reviewed some of the pull tests and the pull test results on at least 6 visits to the MPC facility and found that the welds met the required tensile strength. He said that he participated in actual pull tests of sample welds at the MPC facility and found that the pull test results which were recorded indicated that the required tensile strength was met. He said that if a weld test coupon showed that the weld did not meet the required tensile strength it was not logged in as QA datum because it was only used for testing and set up (of the welding machine) purposes. He said that MPC would set the welding machine such that the welds could sustain about 2000 pounds pull and, when it was found that the machine was set for that range, they (MPC) would go into production. He said that the required tensile strength was 1500 pounds. Mr. Dudek said that he and the following individuals witnessed the pull tests at the MPC facility at various times during the fuel rack fabrication period beginning about February 1980 until December 1980:

Al Ancil, MPC Tool Designer
 Herb Ayers, MPC QC Inspector
 Glenn McConaghy, MPC QC Manager
 Frank Ross, MPC QA Manager
 John Scoran, NES QA Engineer
 Bob Zerfoss, MPC Project Engineer

Mr. H. Hoffman said that he had no first-hand information concerning the above allegation.

Ms. M.C. Key said that the only information that she had concerning the pull tests was obtained during her discussions with Mr. Dudek.

Allegation No. 6

Individual A said that the welding continued even though "they" knew that the pull test equipment was not operating properly.

Comments of Licensee Personnel

Mr. L. Dudek said that when the pull test equipment was suspected of not operating properly due to low oil level, MPC sent weld test coupons to an independent laboratory for testing. He said that the laboratory did not perform the same type test (pull test) that MPC did, but he could not recall the specifics concerning this. He said that he does

not know if MPC was in production at that time and for that reason he could not say for sure that the allegation is true or not. He said that he was not at the MPC facility at that time and that he could not, therefore, verify that MPC did not go into production. He said that he would have to consult with the company from which MPC rented the welding machine to determine if the situation involved a low reading with a higher pull, or vice versa, or if it involved any problem at all.

Mr. H. Hoffman said that he had no first-hand information concerning the above allegation.

Ms. M.C. Key said that she had no information concerning the above allegation.

Investigators' Note: Individual A said that after the problem with the pull test results was identified, MPC looked into the problem and performed necessary maintenance on the equipment.

Allegation No. 7

Individual A said that the same types of problems with the welds also applied to Rack Nos. 6, 7, 8 and 9.

Comments of Licensee Personnel

Mr. L. Dudek said that the above allegation is not true because MPC had "just about" everything ironed out by then. He said that the only problem with Rack Nos. 6, 7, 8 and 9 was the same as the problem with the seam on Rack No. 6 which he said was buckled out a little bit. He said that BG&E told MPC to check it with a feeler gauge and it was found that 3 spot welds were not fused together. Mr. Dudek said that he discovered this problem when he was at the MPC facility.

Mr. H. Hoffman said that he couldn't say if the above allegation is true or not. He said, however, that NES assumed the worst case in their Evaluation Report on the fuel racks which was presented to the NRC.

Ms. M.C. Key said that MPC "cleaned up their act considerably" on Rack Nos. 6, 7, 8 and 9 because of BG&E's complaints about the weld problems with Rack Nos. 1, 2, 3, 4 and 5.

Allegation No. 8

Individual A said that the NES resident inspector at MPC did not do a good job inspecting the fuel racks in that he was not identifying defects in the components before they were assembled.

Comments of Licensee Personnel

Mr. L. Dudek said that he does not know if it was the NES inspector's responsibility to inspect the fuel racks and he (Dudek) is not sure if the NES inspector is qualified to perform the inspections. He said that he didn't know if the NES inspector inspected the fuel racks and he thinks that the NES inspector's job was to witness the inspections being done by MPC and to check the paperwork and the documentation and to report his findings to NES in Danbury, Connecticut.

Mr. H. Hoffman said that a statement to the effect that the NES inspector did not do a good job inspecting the fuel racks was made at the meeting which was held at BG&E's offices with NES and MPC representatives. He said that at the above meeting BG&E expressed disappointment with the problems that were encountered with the fuel rack fabrication project.

Ms. M.C. Key said that she had no first-hand information concerning the above allegation.

Investigators' Note: Messrs. Dudek and Hoffman and Ms. Key said that they would be willing to furnish signed statements under oath with regard to the information which they provided to the NRC during the above interviews on July 28 and 29, 1981.

3. Inspection of Spent Fuel Storage Racks at Calvert Cliffs

To ascertain the condition of the questioned spot welds the investigator performed a visual examination, to the extent possible, of fuel rack number 7 which was at the site awaiting installation in the spent fuel pool.

The investigator found that the type of weld, and the geometry of the completed fuel rack rendered the spot welds inaccessible to visual examination. The fusion area of each weld was hidden between the fused plates, and weld quality could not be verified.

Because of his inability to perform a meaningful visual examination of the component the investigator requested records of quality audits, surveillances and vendor fabrication records related to the fuel racks so that a thorough examination of the records could be done.

4. Examination of QA/QC Records

The investigators were provided with records of audits, surveillance activities and vendor inspection reports related to the alleged problems with the spent fuel storage racks at Calvert Cliffs Unit 1. The records listed below were examined at the Calvert Cliffs site and at the NRC Region I office.

QA Audits of NES at Danbury, Connecticut by the Licensee

Date of Audit:

- April 12-13, 1978
- December 18-20, 1978
- April 2-3, 1979
- June 11-13, 1979
- November 6-8, 1979
- January 22-23, 1980
- October 22-24, 1980
- January 27-28, 1981

QA Audits of MPC at Greenville, South Carolina by NES and the Licensee

- Audit of December 11-13, 1978 - No audit number designated on the report.
- Audit No. QAA-101, April 24-25, 1979
- Audit No. QAA-110, June 25, 1979
- Audit No. QAA-128, February 20-21, 1980
- Audit No. QAA-137, April 28-29, 1980

Surveillance Inspections at MPC Facility by the Licensee

Date of surveillance:

- June 19, 1980
- July 18, 1980
- July 29-30, 1980
- August 13-14, 1980
- September 18-October 30, 1980

Records of Fuel Rack Inspections done by MPC during Rack Fabrication

- Certificate of Conformance for Rack serial number (S/N) NES-001 through -009
- Documentation Check List for Rack S/N NES-006 through -009
- Inspection reports for Rack S/N NES-001
- Inspection reports for Rack S/N NES-006 through -009
- Nonconformance report (NCR) number 55

The above listed records indicated that weld problems, as alleged by Individual A, were encountered during fuel rack fabrication. The records indicated also that the problems were addressed by NES and the licensee and that corrective action was taken and necessary repairs to the welds were made.

The records indicated that the finished product met the applicable acceptance criteria.

V. STATUS OF INVESTIGATION

This investigation continues in an OPEN status pending review of the results of the inspection conducted by NRC Region IV, Vendor Inspection Branch at NES, Danbury, Connecticut during the week of October 19, 1981. The results of that inspection will be reported in an Inspection Report Number 99900762/81-01.