U-601414
L30-89(04-07)-LP
1A.120

ILLINOIS POWER COMPANY

CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

DPH-0190-89
April 7, 1989

Docket 50-461

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Response to NRC Bulletin 88-10,
"Nonconforming Molded-Case Circuit Breakers"

Dear Sir:

Illinois Power Company (IP) has completed the applicable actions requested in NRC Bulletin 88-10, "Nonconforming Molded-Case Circuit Breakers," dated November 22, 1988. A discussion of these actions is contained in Attachment 1.

I hereby affirm that the information in this letter is correct to the best of my knowledge.

Sincerely yours,

D. P. Hall
Vice President

DPH/krm

Attachments (2)

cc: NRC Region III, Regional Administrator
NRC Clinton Licensing Project Manager
Illinois Department of Nuclear Safety
NRC Resident Inspector

IE22
1/1

Attachment 1
to U-601414

IP Response to NRC Bulletin 88-10

Requested Actions

NRC Bulletin 88-10 requested IP identify all molded-case circuit breakers (CBs) purchased prior to August 1, 1988, that are being maintained as stored spares for safety-related (Class 1E) applications and/or all commercial grade CBs that are being maintained as stored spares for future use in safety-related applications. This includes CBs purchased from a CB manufacturer (CBM) or from any other source. Then IP was to verify the traceability of these CBs back to the CBM. If any CBs could not be traced back to the CBM, IP was to identify the manufacturer, model number, and the procurement chain (as far back as possible) for each nontraceable CB.

If more than 80% of the CBs were traceable back to the CBM, IP was to test those CBs that could not be traced back to the CBM, in accordance with the test program described in Attachment 1 of the Bulletin (Attachment 2 to this letter), before startup from the first refueling outage. Additionally, the Bulletin requested that the results of all investigations and tests be maintained for a period of five years after the completion of all requested actions.

IP Response

IP found 906 molded-case CBs designated for Class 1E use in stores that were purchased prior to August 1, 1988; all but one were traceable to the CBM. The non-traceable breaker is a Westinghouse model LBB2400, purchased from WESCO by Power Conversion Products Incorporated (PCPI) on purchase order number 29665 dated September 22, 1982. The IP purchase order number for this molded-case CB is X25190 dated May 4, 1985. The breaker was received at Clinton Power Station (CPS) on October 26, 1985. It was accompanied by a PCPI Certificate of Conformance. There is no Westinghouse Certificate of Conformance on file at IP, but the CB is a Westinghouse breaker traceable by purchase to WESCO, which is a Westinghouse Division acting as a distributor for Westinghouse products. The CB was purchased by PCPI from WESCO prior to the suspect period (8/1/83 - 8/1/88). IP Quality Assurance audits of PCPI from 1981 to the present indicate that their quality assurance program is adequate. This conclusion is based on IP's review of PCPI's sub-supplier audits and on evaluations of PCPI's receiving inspection records. Additionally, the CB was visually inspected for signs of tampering in accordance with the criteria provided by Nuclear Management and Resources Council (NUMARC). IP believes that this reasonably establishes the breaker in question as an acceptable product.

IP believes that because 99.88% of the total number of breakers designated for Class 1E use in stores have verified traceability and that the one nontraceable breaker can be reasonably assumed to be an acceptable product, no further IP action (test) is warranted regarding this one breaker.

All 906 molded-case CBs are being maintained in stores for future Class 1E use; 905 meet the criteria of Action 7 of the Bulletin and the remaining one has been determined to be acceptable as indicated in the discussion above. The records pertaining to this investigation have been reviewed by IP Quality Assurance, are available on site for NRC review, and will be maintained on site for a period of five years.

All applicable actions requested of IP have been completed.

OMB No.: 3150-0011
NRCB 88-10

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

November 22, 1988

NRC Bulletin No. 88-10: NONCONFORMING MOLDED-CASE CIRCUIT BREAKERS

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

The purpose of this bulletin is to request that addressees take actions to provide reasonable assurance that molded-case circuit breakers (CBs), including CBs used with motor controllers, purchased for use in safety-related applications without verifiable traceability[1] to the circuit breaker manufacturer (CBM)[1] perform their safety functions.

Description of Circumstances:

NRC Information Notice No. 88-46, "Licensee Report of Defective Refurbished Circuit Breakers," dated July 8, 1988 and Supplement 1 thereto, dated July 21, 1988, discussed a report by Pacific Gas and Electric Company that indicated that its Diablo Canyon Nuclear Power Plant was supplied 30 CBs by Anti-Theft Systems, Inc. through a local electrical distributor. These CBs (Square D molded-case, type KHL 36125) were intended for use in non-safety-related applications at the Diablo Canyon Nuclear Power Plant. Square D Company reported that an inspection and testing of these breakers determined that the CBs were refurbished Square D Company equipment. Furthermore, Square D reported that several of the circuit breakers tested did not comply with Square D or Underwriters Laboratories, Inc. (UL) specifications for all of the electrical tests performed. Information Notice No. 88-46 also listed several California companies that were involved in supplying surplus refurbished and possibly defective refurbished electrical equipment to the nuclear industry.

During recent NRC inspections, additional examples were identified that indicate a potential safety concern regarding electrical equipment supplied to nuclear power plants. The NRC is concerned that equipment being procured as new and assumed to meet all applicable plant design requirements and/or original manufacturer's specifications may, in fact, not conform to these requirements and specifications.

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1. Refer to Attachment 2 for Definition of Terms

13 pp.

The actions requested in this bulletin are limited to molded-case CBs. Molded-case CBs are tested and calibrated at the manufacturer's plant in accordance with recognized industry standards, such as UL-489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and National Electrical Manufacturers Association (NEMA)-AB1, "Molded-Case Circuit Breakers." Since molded-case CBs have factory-calibrated and sealed elements, any unauthorized modification or refurbishing of these CBs could jeopardize their design capability and reliability.

The NRC is concerned that the reliability and capabilities of refurbished CBs purchased as commercial grade (non-Class 1E) for later upgrading to safety-related (Class 1E) applications may not meet the minimum commercial grade standards. In addition, the NRC is concerned about the reliability and capabilities of commercial grade CBs upgraded to safety-related because of some observed inadequacies in the dedication process and numerous failures found during the testing of some of these CBs. In order to properly dedicate electrical items procured as commercial grade for subsequent use in safety-related applications, the dedication process should build from the commercial grade quality, include a proper evaluation of seismic and environmental qualification, confirm critical parameters, and include testing as appropriate.

Molded-case CBs purchased from the CBM or that can be traced to the CBM are of lesser concern than other molded-case CBs because CBs from the CBM, whether safety-related or commercial grade, are manufactured under controlled conditions to conform to a proven design. Safety-related CBs purchased as Class 1E from the CBM are controlled under quality assurance (QA) programs that conform to Appendix B of 10 CFR Part 50. While upgrading programs may vary in quality, the controls exercised by the CBM over the manufacturing activities provide reasonable assurance that improperly refurbished components have not been introduced and passed through the upgrading process. Furthermore, the redundancy of safety systems and the in-service use of CBs provide a reasonable basis for accepting installed replacement CBs that have been procured from the CBM or that can be traced to the CBM.

The NRC currently believes that the concerns addressed in this bulletin do not apply to electrical equipment (safety-related and commercial grade) originally installed in plants. This equipment appears to have been procured during plant construction from CBMs with full certification. The large quantities of electrical assemblies or components procured under bid packages during plant construction reduce the possibility of any original plant equipment being supplied by vendors doing refurbishing.

Although the actions requested in this bulletin only apply to safety-related molded-case CBs, the NRC intends to monitor industry programs to ensure that other molded-case CBs, which may have been installed as replacements, installed during modifications, or are being maintained as stored spares, are suitable for their intended service. Addressees are encouraged to participate in a joint program. If industry programs are either not timely or not sufficient, additional regulatory actions will be taken, as appropriate.

The NRC requested and received comments from the Nuclear Management and Resources Council (NUMARC), the National Electrical Manufacturers Association (NEMA), and the Underwriters Laboratories, Inc. (UL), during the preparation of this bulletin. These comments were considered and some were appropriately incorporated into this bulletin.

NEMA has commented to the NRC that determination of the critical performance characteristics of durability and short-circuit capabilities of CBs requires destructive testing of selected breakers that are representative of CBs to be placed in service. Because a refurbished breaker may not have been refurbished under controlled conditions to conform to a proven design, destructively testing selected breakers will not infer anything about a refurbished CB. UL provided specific comments on the tests in Attachment 1 of this bulletin. In addition, they stated that, "it is UL's opinion that the test program is not adequate to provide assurance that the tested, non-traceable, circuit breakers would be suitable for their intended purpose." Although the test program described in Attachment 1 of this bulletin does not provide complete verification of all the performance requirements and characteristics of molded-case CBs (such as seismicity or fault clearing capability), the NRC considers the test program to provide a reasonable assurance of performance requirements and characteristics most important to ensuring reactor safety. This, considered in conjunction with (1) the limited number of nonconforming CBs that may remain installed in safety-related systems following implementation of the actions requested by this bulletin, (2) the existence of redundant safety-related systems in nuclear power reactors that are required by NRC regulations, (3) the license required in-service testing of installed CBs performed to demonstrate the CB's functional performance, and (4) the low frequency of occurrence of seismic events and severe electrical faults, provides a reasonable assurance that nuclear power reactors can be operated without undue risk to the health and safety of the public.

The NRC investigation of this issue is not complete. A supplement to this bulletin may be issued to include other electrical equipment or a longer procurement review period if warranted by the results of the ongoing evaluations or the results of testing requested in this bulletin.

Actions Requested:

1. All addressees are requested to perform the following review by March 1, 1989:

   a. Identify all molded-case CBs purchased prior to August 1, 1988, that are being maintained as stored spares for safety-related (Class 1E) applications or commercial grade CBs that are being maintained as stored spares for future use in safety-related applications; this includes CBs purchased from a CBM or from any other source. If the number of these stored spare CBs is less than 50 at a nuclear plant site, then randomly select CBs purchased between August 1, 1983 and August 1, 1988 that have been installed in safety-related applications as replacements or modifications to form a minimum sample of 50 CBs per nuclear plant site.

b. Verify the traceability of these CBs.

c. Identify the number, manufacturer, model number, and to the extent possible the procurement chain for all those CBs identified in (1a) that cannot be traced to the CBM. For installed CBs, also identify each system in which they are/were installed.

2. All holders of operating licenses who identify installed CBs per item 1 above or item 4 below that cannot be traced to a CBM are requested to prepare, within 30 days of the completion of each item, an analysis justifying continued operation until items 1 through 5 of the actions requested in this bulletin have been completed.

3. All addressees who identify 80 percent or more CBs traceable to the CBM per item 1 above are requested to test the CBs that are not traceable to the CBM in accordance with the test program described in Attachment 1. Any installed CBs that fail any of these tests should be replaced with CBs that meet the criteria of item 7 of the actions requested or CBs that pass all tests in accordance with the testing program described in Attachment 1. If more than 10 percent of the CBs tested fail any of the tests described in Attachment 1, continue with item 4; otherwise, proceed to item 6 of the actions requested.

   Holders of operating licenses are requested to complete this testing program before startup from the first refueling outage beginning after March 1, 1989. Holders of construction permits are requested to complete this testing program before fuel load.

4. All addressees who identify less than 80 percent of the CBs traceable to the CBM per item 1 above or who identify a failure rate of more than 10 percent for the CBs tested per item 3 above are requested to perform the following actions:

   a. Identify all molded-case CBs that have been purchased between August 1, 1983 and August 1, 1988, and installed in safety-related applications as replacements or installed during modifications.

   b. Verify the traceability of these CBs.

   c. Identify the number, manufacturer, model number, system in which they are/were installed, and to the extent possible, the procurement chain for all those CBs identified in (4a) that cannot be traced to the CBM.

5. All addressees who identify installed CBs that cannot be traced to the CBM per item 4 above are requested to replace these CBs with components that meet the criteria of item 7 of the actions requested or to test them in accordance with the program described in Attachment 1; CBs that fail any of these tests should be replaced with CBs that meet the criteria of item 7 of the actions requested or CBs that pass all tests in accordance with the test program described in Attachment 1.

Holders of operating licenses are requested to replace or to test at least one-half, or all if the total number is less than 75, of these installed CBs before startup from the first refueling outage beginning after March 1, 1989. The remaining CBs should be replaced or tested before startup from the second refueling outage beginning after March 1, 1989.

Holders of construction permits are requested to replace or to test these installed CBs before fuel load.

6. Information generated while performing the actions requested in items 1, 2, 3, 4, and 5 above should be documented and maintained for a period of 5 years after the completion of all requested actions.

7. With the exception of actions taken in response to items 3 and 5 of the actions requested above, molded-case CBs installed in safety-related applications after August 1, 1988 should be:

   a. Manufactured by and procured from a CBM under a 10 CFR 50, Appendix B, program; or

   b. Procured from a CBM or others with verifiable traceability to the CBM, in compliance with applicable industry standards, and upgraded to safety-related by the licensee or others using an acceptable dedication program. The NRC encourages addressees to significantly upgrade their dedication programs through a joint industry effort to ensure their adequacy and consistency. The NRC will monitor these industry initiatives and if they are not sufficient or not timely, or if problems with the dedication of commercial grade equipment for safety-related use continue, the NRC will take appropriate regulatory actions.

8. Addressees that cannot meet the schedule for the actions requested above and/or the corresponding reporting requirements below, should justify to the NRC their proposed alternative schedule.

Reporting Requirements:

1. All holders of operating licenses are required to provide a written report by April 1, 1989, that:

   a. Confirms that only molded-case CBs that meet the criteria of item 7 of the actions requested are being maintained as stored spares for future use in safety-related applications.

   b. Summarizes the total number, manufacturer, model number, and to the extent possible the procurement chain of those CBs that could not be traced to the CBM in items 1 and 4 of the actions requested. For installed CBs, also identify each system in which they are/were installed. If item 4 of the actions requested has not been completed

by April 1, 1989, due to the schedule for tests in item 3 of the actions requested, this information should be updated within 30 days of the completion of item 4 to address those additional CBs that could not be traced to the CBM.

c. Confirms that items 1, 2, 3, 4, 5, 6 and 7 of the actions requested have been completed or will be implemented as requested.

2. All holders of operating licenses are required to submit a report that summarizes available results of tests conducted in accordance with items 3 and 5 of the actions requested within 30 days after startup from the first and second refueling outages beginning after March 1, 1989. For CBs that pass these tests, the only information required is the number, manufacturer, model number, and to the extent possible the procurement chain of CBs tested (summary report format is acceptable). For CBs that fail these test(s), these reports should indicate the test(s) and the values of test parameter(s) at which the failure(s) occurred, as well as the corresponding manufacturer, model number, and to the extent possible, the procurement chain.

3. All holders of construction permits are required to provide a written report by April 1, 1989, that:

a. Confirms that only molded-case CBs that meet the criteria of item 7 of the actions requested are being maintained as stored spares for future use in safety-related applications.

b. Summarizes the total number, manufacturer, model number, and to the extent possible the procurement chain of those CBs that could not be traced to the CBM in items 1 and 4 of the actions requested. For installed CBs, also identify each system in which they are/were installed. If item 4 of the actions requested has not been completed by April 1, 1989, due to the schedule for tests in item 3 of the actions requested, this information should be updated within 30 days of the completion of item 4 to address those additional CBs that could not be traced to the CBM.

c. Confirms that items 1, 3, 4, 5, 6 and 7 have been completed or will be implemented before fuel load.

4. All holders of construction permits are required to submit a report that summarizes the results of tests conducted in accordance with items 3 and 5 of the actions requested within 30 days after fuel load. For CBs that pass these tests, the only information required is the number, manufacturer, model number, and to the extent possible, the procurement chain (summary report format is acceptable). For CBs that fail these test(s), the report should indicate the test(s) and the values of test parameter(s) at which the failure(s) occurred, as well as the corresponding manufacturer, model number, and to the extent possible, the procurement chain.

The written reports required above shall be addressed to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, under oath or affirmation under the provisions of Section 182a, Atomic Energy Act of 1954, as amended. In addition, a copy shall be submitted to the appropriate Regional Administrator.

This request is covered by Office of Management and Budget Clearance Number 3150-0011 which expires December 31, 1989. The estimated burden hour is 1000 to 10,000 man-hours per plant response, including assessment of these requirements, searching data sources, testing, and analyzing the data, and preparing the required reports. Comments on the accuracy of this estimate and suggestions to reduce the burden may be directed to the Office of Management and Budget, Room 3208, New Executive Office Building, Washington, D.C., 20503, and to the U.S. Nuclear Regulatory Commission, Records and Reports Management Branch, Office of Administration and Resource Management, Washington, D.C., 20555.

If you have any questions regarding this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate NRC regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: Paul Gill, NRR
(301) 492-0811

Jaime Guillen, NRR
(301) 492-1170

Attachments:
1. Test Program for Molded Case Circuit Breakers
2. Definition of Terms
3. List of Recently Issued NRC Bulletins

TEST PROGRAM FOR MOLDED-CASE CIRCUIT BREAKERS

1.0 Test Program Objectives

The objective of this proposed test program is to verify the reliability and capabilities of molded-case circuit breakers (CBs).

For the safety of personnel and others involved with the activities related to these proposed tests, appropriate safety practices, such as ANSI/NFPA 70E, "Electrical Safety Requirements for Employee Workplaces," Part II, should be followed.

These proposed tests have been based on tests described in industry standards, such as NEMA AB-1, "Molded-Case Circuit Breakers," NEMA AB-2, "Procedures for Field Inspection and Performance Verification of Molded-Case Circuit Breakers Used in Commercial and Industrial Applications," UL 489 "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NETA STD ATS-1987, "National Electrical Testing Association, Acceptance Testing Specifications."

2.0 Test Procedures for CBs

The following tests should be performed in the sequence listed. CBs failing any of these tests should be considered unacceptable for safety-related applications.

2.1 Mechanical Test

The CB should be operated, reset, and closed a minimum of five times, to ensure that the latching surfaces are free of any binding.

2.2 Individual Pole Resistance or Millivolt Drop Test (Ref. NETA STD ATS-1987 & NEMA AB-2)

The contact resistance of each pole of the CB should be measured at ambient temperature. Three readings of each pole should be taken with the CB operated without load between each reading. The average of three readings for each pole should be calculated and compared with the manufacturer's contact resistance data or with those values of similar CBs from the same manufacturer. Also, the average value for each pole should be compared with the average of the other poles and the difference between the pole values should not exceed 50 percent of the lowest value; or

A millivolt drop test may be performed by applying a direct current across the closed CB contacts and measuring the voltage drop due to the contact resistance. The millivolt drop test should be performed at room temperature. Direct current should be applied across each

pole and the millivolt drop and test current recorded for each pole. Three readings of each pole should be taken with the CB operated without load between each reading. The average of the three readings for each pole should be calculated and compared with the manufacturer's value for acceptance of the breaker.

2.3 Rated Current Hold-In Test (Ref. NEMA AB-1 & UL 489)

This test should be conducted at 100% rated current and at an ambient air temperature of 25°C ± 3°C, and followed by a test at 135% rated current and at an ambient temperature of 25°C ± 3°C.

Equal 100% rated currents should be applied to all poles of the CB. The CB must not trip within 1 hour for CBs rated 50 amperes or below or within 2 hours for CBs rated over 50 amperes during this test. At the end of the 100% rated current test, the current should be increased to 135% and the CB should trip within 1 hour for CBs rated 50 amperes or below or within 2 hours for CBs rated over 50 amperes.

2.4 Overload Test (Ref. NEMA AB-1 & UL 489)

This test consists of one operating cycle (i.e., closing action followed by an opening action) of the CB at 600% rated current. This test may be conducted at low voltage. There should be no electrical or mechanical breakdown of the CB during this test.

2.5 Instantaneous Trip Test (Ref. NEMA AB-1 & UL 489)

2.5.1 Fixed Instantaneous Setting CBs

Each pole of the CB should be tested for pickup of the instantaneous unit. Each pole must be between 75% and 125% of the instantaneous trip rating. The trip time should not exceed 0.1 seconds (6 cycles).

2.5.2 Adjustable Instantaneous Setting CBs

This test is the same as that in Section 2.5.1 except that each pole must be tested at the lowest and highest settings.

The trip value for the lowest setting should be between 75% and 125% of the lowest setting, and the highest setting should be between 80% and 120% of the highest setting.

2.5.3 Short-Time Trip Setting Test

This test is applicable only if the CB is equipped with the short-time delay trip. This test should be conducted at an ambient air temperature of 25°C ± 3°C. The operation of the short-time delay unit should be within 90% and 125% of the overcurrent setting of the CB as shown on the manufacturer's time-current curves.

2.6 Time Delay Overcurrent Trip (Ref. NEMA AB-2)

This test should be conducted at an ambient air temperature of 25°C ± 3°C.

A current of 300% (at low voltage) of the marked rating should be applied to each pole of the CB. The trip time for each pole should be compared with the time shown in the CB manufacturer's time-current curves. If the test trip times obtained for each pole are not within the time band shown on the CB manufacturer's time-current curves, then the test trip must not exceed the time specified in Table 1 and the acceptance of the CBs must be evaluated with the criteria listed below:

TABLE 1
VALUES FOR OVERCURRENT TRIP TEST
(AT 300% OF RATED CONTINUOUS CURRENT OF CIRCUIT BREAKER)
(REF. NEMA AB-2)

Breaker Voltage Volts	Range of Rated Continuous Current Amperes	Maximum Tripping Time In Seconds
240	15-45	50
240	50-100	70
600	15-45	70
600	50-100	125
240	110-225	200
240	250-400	300
600	110-225	250
600	250-400	300
600	450-600	350
600	700-1200	500
600	1400-2500	600
600	3000-5000	650

Minimum Tripping Time: If the minimum tripping times are lower than indicated by the manufacturer's time-current curves for the CB under test, the CB should be retested after it has been cooled to 25°C. If the values obtained are still lower after retest, the coordination with upstream and downstream CB should be evaluated. If no problem with coordination is indicated, then the CB is acceptable.

Maximum Tripping Time: If the tripping time exceeds the maximum tripping time shown on the manufacturer's time-current curves but is below the time shown in Table 1, check the CB time against the protection requirements of the circuit (such as cable, penetration, etc.) to ensure that the CB provides the protection, as well as the coordination with upstream and downstream CBs. If the CB provides the necessary protection and coordination, then the CB is acceptable.

Maximum Allowable Time: If the tripping time of the CB exceeds the trip time shown in Table 1, the breaker is unacceptable for Class 1E applications.

2.7 Dielectric Tests (Ref. NEMA AB-1 & UL-489)

The dielectric test should be conducted at an ac test voltage of 1760 volts (80% x [2 x rated voltage + 1000 volts]), or at 2500 volts dc for 1 minute withstand. The dielectric test should be conducted for (1) line to load terminals with CB open, (2) line to line terminals with CB closed, and (3) pole to ground with CB open, and (4) pole to ground with CB closed.

Attachment 2
NRCB 88-10
November 22, 1988

DEFINITION OF TERMS

CIRCUIT BREAKER MANUFACTURER (CBM)

The manufacturing facility that actually produced the circuit breaker being purchased.

VERIFIABLE TRACEABILITY

Documented evidence such as a certificate of compliance that establishes traceability of purchased equipment to the CBM. If the certificate of compliance is provided by any party other than the CBM, the validity of such certificate must be verified by the licensee or permit holder through an audit or other appropriate means.

DEDICATION PROCESS

The process by which commercial grade (non-Class 1E) equipment is upgraded to safety-related (Class 1E) and is thereby considered qualified for use in safety-related applications. The dedication process must include:

a. A technical evaluation to determine the characteristics critical to fulfilling the safety function(s).

b. An acceptance process to ensure that those critical characteristics are met.

Attachment 3
NRCB 88-10
November 22, 1988

LIST OF RECENTLY ISSUED NRC BULLETINS

Bulletin No.	Subject	Date of Issuance	Issued to
88-05, Supplement 2	Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey	8/3/88	All holders of OLs or CPs for nuclear power reactors.
88-08, Supplement 2	Thermal Stresses in Piping Connected to Reactor Coolant Systems	8/4/88	All holders of OLs or CPs for light-water-cooled nuclear power reactors.
88-09	Thimble Tube Thinning in Westinghouse Reactors	7/26/88	All holders of OLs or CPs for W-designed nuclear power reactors that utilize bottom mounted instrumentation.
88-08, Supplement 1	Thermal Stresses in Piping Connected to Reactor Coolant Systems	6/24/88	All holders of OLs or CPs for light-water-cooled nuclear power reactors.
88-08	Thermal Stresses in Piping Connected to Reactor Coolant Systems	6/22/88	All holders of OLs or CPs for light-water-cooled nuclear power reactors.
88-05, Supplement 1	Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey	6/15/88	All holders of OLs or CPs for nuclear power reactors.
88-07	Power Oscillations in Boiling Water Reactors (BWRs)	6/15/88	All holders of OLs or CPs for BWRs.

OL = Operating License
CP = Construction Permit