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March 6, 1980

S. W. Shields
Vice President - Electric System

Mr. Gaston Fiorelli
United States Nuclear
Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Docket Nos.: STN 50-546
STN 50-547

Construction Permit Nos.:
CPPR-170
CPPR-171

Dear Sir:

In accordance with the provisions of Section 2.201 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, Public Service Indiana offers the following information, in addition to PSI's letter (DSN 1102795068) dated November 2, 1979, in response to the items of noncompliance identified in Inspection Report 50-546/79-09; 50-547/79-09.

Item of Noncompliance (546/79-09-01; 547/79-09-01)

1. The Region III Inspector determined that QC inspection personnel had not adequately performed preplacement inspections specifically:
 - 1.a July 10, 1979 - Reinforcing steel failed to meet the minimum clear distance to formed surfaces as specified in S&L Specification Y-2722, Section 412.
 - 1.b July 10, 1979 - Reinforcing steel did not meet the minimum cleanliness requirements specified by ACI 318-71, Section 7.2.1 and the CRSI "Manual of Standard Practice", Chapter 8 as required by S&L Specification Y-2722, Section 412.
 - 1.c July 10, 1979 - The horizontal construction joint was not properly prepared for bond as specified in ACI 301-72, Chapter 6, as required by S&L Specification Y-2722, Section 411.

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- 1.d July 10, 1979 - The vertical construction joint contained embedded contaminants (i.e., visqueen and styrofoam material) and areas of apparent honeycomb extending from the top of the vertical construction joint to the bottom around the projecting horizontal reinforcing steel.
- 1.e July 17, 1979 - Reinforcing steel failed to meet the minimum clear distance to formed surfaces as specified by S&L Specification Y-2722, Section 412.
- 1.f July 17, 1979 - During concrete chipping to remove contaminants from the 28 Line bulkhead, a featheredge condition was created. This condition is not in accordance with ACI 301-72, Chapter 8, as referenced by S&L Specification Y-2722.

Corrective Action Taken and Results Achieved

- 1.a Clear distance in accordance with Specification Y-2722, Section 412 was obtained by Newberg-Marble Hill as required; the reinforcing was then reinspected and accepted.
- 1.b Contaminant was removed from reinforcing by Newberg-Marble Hill; the reinforcing was then reinspected and accepted.
- 1.c Joint was reprepared to meet Specification Y-2722, Section 411, then reinspected and accepted by Newberg-Marble Hill.
- 1.d Same as 1.c.
- 1.e Same as 1.a.
- 1.f Featheredge was eliminated by saw cutting by Newberg-Marble Hill; the bulkhead was then reinspected and accepted.

Corrective Action Taken to Prevent Recurrence

1.a, e, f

Procedures shall be revised to include allowable clear distances to formed surfaces and to prohibit featheredge conditions. Inspection hold points will be established to check for allowable clear distances



to formed surfaces. Newberg-Marble Hill has committed to conduct additional training, is planning to increase the number and experience of its QC staff personnel (including a new QC Supervisor), and will reassign QC personnel to increase the experience of the staff in areas of weakness. Newberg has committed to institute a 100% overview program of their on-site subcontractors to assess the effectiveness of their programs. Records of procedure revisions, personnel changes and training will be on the file in Newberg's offices.

- 1.b In addition to the actions described in 1.a, e, f above, Newberg is further revising its Procedure QAPN-10 to include acceptance criteria for reinforcing steel cleanliness.
- 1.c Newberg has committed to make personnel changes and reassignments and provide additional training for both production and QC personnel and to improve performance and experience levels in concrete placement and inspection personnel.
- 1.d In addition to the action described in 1.c above, Newberg has included construction joints as a hold point for inspection and will prepare construction joints in accordance with ACI 301, Chapter 6, (i.e., waterblasting, bush hammers) for all Category I concrete.

Date When Full Compliance Will be Achieved

PSI is presently evaluating Newberg's corrective action plan and procedure revisions and will update the NRC on a full compliance date by April 18, 1980.

Item of Noncompliance (546/79-09-02; 547/79-09-02)

- 2. The following instances were noted in which design documents do not include appropriate quality standards, in that:
 - 2.a No definitive requirement which specifies the maximum allowable lateral movement of fresh concrete during placement presently exists.
 - 2.b The seven day cure requirement for concrete is not adequately defined in S&L Specification Y-2722 to assure the proper curing time.



- 2.c S&L Specification Y-2722, Section 413.6.h. does not prevent the continued rapid discharge and placement of concrete during tightened sampling initiated as a result of concrete which does not meet specification.
- 2.d S&L Specification Y-2850, Section 406.3 does not provide adequate control to prevent the inadvertent use of nonconforming aggregate in that test results are not available prior to the use of such aggregate.

Corrective Action Taken

- 2.a The Design Documents (Specification Y-2722, ACI 301, 304 and 309) were reviewed and evaluated. PSI believes that these specifications adequately address allowable lateral movement of concrete. However, these requirements of the design documents are not adequately addressed in Newberg's Procedure WPN 9. Therefore, WPN 9 shall be revised "to prohibit intentional lateral movement of fresh concrete by lateral movement of internal vibrators", and to state that, "vibrators should be inserted and withdrawn vertically at close intervals . . .". The distance between insertion points (intervals) shall be determined by the contractor in accordance with recommendations of the vibrator manufacturer. Lateral movement of concrete due to vertical insertions and withdrawals, is acceptable by ACI standards. When areas of inaccessibility do exist, concrete may be moved laterally with shovels or other means which do not cause segregation of the concrete.
- 2.b The seven day curing time will be clarified in Specification Y-2722 as 168 hours or that time required for the subject concrete to reach 70% of its required design strength. (See note.) When the curing environment is such that concrete reaches 70% of its design strength, forms or protection, external heating or water sources, etc., may be removed and curing discontinued. Forms may be removed prior to the attainment of the 70% design strength criterion providing the ambient temperatures surrounding the concrete are maintained in accordance with Specification Y-2722 requirements, and the concrete surfaces are covered with an application of approved curing compounds to prevent moisture loss.

NOTE: The percentage of design strength shall be determined by field cylinders cured in similar ambient



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temperature conditions to that of the in-place concrete. Cylinders shall be stored in the area of lowest temperature and out of direct sunlight or external heat source.

- 2.c S&L specifications provide a control limit (allowable limit) and an extreme limit (extreme value). Any concrete found to be beyond the extreme limit is not placed. The tightened sampling testing requirements provide additional control tests and cylinders to provide the acceptability of all concrete placed.

In addition, S&L Engineers have committed to evaluate an on-site correlation program, which will be established to study the fresh concrete characteristics (slump, air content, temperature and compressive strength) at two locations during production, delivery and placement of concrete. A procedure describing the on-site correlation program will be established and implemented for a trial period to determine the fresh concrete characteristics at the test lab versus the point of placement. Providing a reliable trend or correlation can be established, S&L may revise Specification Y-2722 to allow concrete sampling at the placement point, or other points coincident thereto (mixing point), as defined below.

Delivery Point - The point of discharge in the case of a truck agitator unit, or nonagitator unit when another conveying device is to be used to transport the plastic concrete to the placement point. Where a truck agitator unit is used in the transit of concrete, the delivery point and the mixing point are considered coincident when: (1) the delivery point is not more than a distance of two miles and an average of one-half hour in transit from the mixing point, and (2) the delivered concrete commences to be placed within an average of one-half hour from the time the transporting vehicle arrives at the delivery point.

Mixing Point - The point of discharge of plastic concrete from a central mix plant. For truck mixed concrete the mixing point and delivery point are defined as coincident.



Placement Point - The point of discharge of plastic concrete into the forms. Except for pumped concrete the placement point and the delivery point are considered coincident when five minutes or less is used in transit of the concrete from the delivery point to the placement point.

This proposed design change should minimize or eliminate the continued rapid discharge and placement of out of spec concrete during normal or tightened sampling, because in-process tests will actually be at the mixing point (when the mixing point is considered coincident to the placing point). Thus, acceptance and rejection of the in-process test results can be determined prior to discharge and placement of unacceptable concrete.

- 2.d S&L Specification Y-2850 does provide adequate control to prevent the inadvertent use of unacceptable nonconforming aggregates by periodic testing of aggregates from previously approved sources. (See note below.)

Since it is the contractor's responsibility to provide adequate measures to minimize nonconforming aggregate conditions, Newberg-Marble Hill Procedure WPN 7 shall be revised to require additional measures for separation of acceptable aggregates (from periodic tests) and newly delivered aggregates. Separation will be as necessary to allow periodic test results to be available prior to newly delivered stone being used for production. Daily test results from aggregate samples taken from production stockpiles need not be available once periodic test results are complete.

NOTE: Specification Y-2850, Inspection and Testing Services, references the concrete work Specification Y-2722. Both Specifications must be evaluated together to assess the adequacy of controls to prevent unacceptable concrete. The continuous process of testing aggregates includes initial tests to qualify the source and subsequent monthly and bi-annual testing to detect major material variations in the geology or mineralogy of the source. The remaining testing (weekly, daily, etc.) is necessary and desirable to detect trends and variations of the processing, handling and stockpiling of aggregate.



Presently the Specification requires daily aggregate tests during production from site stockpiles and periodic aggregate tests for new deliveries of aggregate. (These aggregate tests are described ASTM C117, C136, C40 and C87.) These tests, when run in strict conformance to ASTM standard methods, require 24 to 48 hours.

The daily tests during the production are run to determine conformance to the requirements for cleanness (ASTM C40 and C117) and for grading (ASTM C136) and by Specification must be secured from the aggregates at the point of batching. Due to the time of testing, 24 to 48 hours, it is impossible to have the results the same day the materials are sampled. However, it is not the daily test during production that determines the acceptability of the aggregate, but the periodic tests on the incoming aggregate. The periodic tests are presently run on a weekly basis and all aggregate delivered during a seven consecutive day or five weekday period is considered acceptable if the results are in conformance to the Specification. If results are nonconforming, an NCR is initiated to provide engineering evaluation of the nonconforming aggregate. Since the compressive strength results (along with statistical history of the concrete quality per ACI 214) finally assures the quality and acceptability of the concrete, it is not necessary to revise or impose additional controls to the Y-2850 Specification.

Corrective Action Taken to Prevent Recurrence

- 2.a-2.d Procedures or Specifications shall be revised as described above. Following issuance of these revisions, Newberg will perform documented training and indoctrination of its personnel.

Date When Full Compliance Will be Achieved

- 2.a-2.d PSI is presently completing a constructibility review of the Specifications Y-2722 and Y-2850 and will update the NRC on a full compliance date by April 18, 1980.



Item of Noncompliance (546/79-09-03; 547/79-09-03)

3. The Region III Inspector determined that concrete placement violated Specifications and that procedure did not exist for some items of work, specifically:
- 3.a (Placement No. 1CW-EXT-9) - Failure to consolidate the preceding 2 foot concrete lift prior to depositing fresh concrete in two areas. ACI 301-72 and ACI 304-73, specified by S&L Specification Y-2722, Section 413.2 requires that concrete be placed in horizontal lifts not exceeding 2 feet in depth and be consolidated by vibration.
 - 3.b (Placement No. 1CW-EXT-9) - Internal concrete vibrators that were inserted at approximately 30-inch intervals, exceeding the allowable distance of about 18 inches specified by S&L Specification Y-2722 and ACI 301-72.
 - 3.c No procedural requirements exist for the mixing, installation and inspection by dry pack material used in the repair of defective concrete.
 - 3.d No documented instructions or procedures exist to specify the type of repair (i.e., dry pack, concrete pour back, grout pour back, pressure grout or gunite) which should be used for any specific defective area based on the void size, configuration and accessibility.

Corrective Action Taken and Results Achieved

- 3.a Placement of concrete was discontinued and areas in question reconsolidated.
- 3.b Same as 3.a.
- 3.c All concrete repair activities in safety-related areas have been stopped.
- 3.d Same as 3.c.

Corrective Action Taken to Prevent Recurrence

- 3.a, b Newberg-Marble Hill has committed additional training and more specific assignments of production personnel to assure adequate consolidation of the concrete.



Training shall take place after the Procedure WPN 9 is revised as described in response to Item 79-09-02, Corrective Action Taken, Paragraph 2.a. In addition, Newberg Procedure QAPN 10 shall be revised to include a training session prior to the startup of each major placement and the initiation of WPN 34, "Preplacement Evaluation". WPN 34 shall identify unique characteristics of each major pour and shall be used to train Newberg personnel on the proper techniques for concrete placement methods unique to each pour.

- 3.c, d Newberg Procedure WPN 35 will be developed to specify requirements for type of repair, mixing, installation and inspection of dry pack, including methods for molding cubes representing the dry pack compressive strength. Newberg Procedures WPN 25 and QAPN 10 will be revised to reflect the changes to WPN 35.

Date When Full Compliance Will be Achieved

PSI is currently evaluating Newberg's corrective action plan and procedure commitments and will update the NRC on a full compliance date by April 18, 1980.

Item of Noncompliance (546/79-09-05; 547/79-09-05)

5. Marble Hill PSAR, Chapter 1, Section 1.7, commits to Regulatory Guide 1.28 (June 7, 1972) and therefore to ANSI N45.2-71. ANSI N45.2-71, Section 17 states that, "Measures shall be established . . . to assure that conditions adverse to quality . . . are promptly identified and corrected. . .".

Contrary to the above, the Region III Inspector observed or confirmed:

- 5.a Two honeycomb areas which were not identified, tagged or repaired as required by QAPN 10.
- 5.b Thirty defective concrete areas containing either minor or major honeycomb, and/or various contaminants, which were superficially patched before complete removal of all defective material. These areas were not identified or tagged as required by QAPN 10.
- 5.c The availability of nonconforming "dead cement" for use in making concrete repairs, originally identified on June 26, 1979, was not yet corrected on July 19, 1979.



Corrective Action Taken

- 5.a, b All exposed honeycomb area or areas of defective concrete will be identified and documented. As part of Marble Hill Units 1 & 2 Construction Acceptance Verification Program, PSI and Newberg-Marble Hill will inspect 100% of the exposed concrete surfaces to identify (1) all patches except tie holes and (2) all unrepaired surface defects. All patches and unrepaired areas will be identified on NCRs and repaired/reworked as required by engineering disposition of NCR.
- 5.c Use of bulk cement has been discontinued and provisions for bagged material handling will be incorporated into WPN 35.

Corrective Action Taken to Prevent Recurrence

- 5.a, b Newberg-Marble Hill has committed to provide additional training, increase their inspection staff and reassign QC personnel to identify defective concrete areas during a post placement/stripping inspection. Areas of defective concrete shall be documented on NCRs and repaired/reworked as required by engineering disposition. Procedures will be revised to require the post placement inspection and documentation described.
- 5.c Newberg Procedure WPN 35 shall be developed to include provisions for bagged material handling and to discontinue the use of bulk cement.

Date When Full Compliance Will be Achieved

- 5.a, b PSI has begun the 100% inspection of exposed concrete surfaces for the Construction Verification Program and will update the NRC on a full compliance date by April 18, 1980.
- 5.c Full compliance is expected by April 18, 1980.

Item of Noncompliance (546/79-09-07; 547/79-09-07)

7. The Region III Inspector determined that personnel were inadequately trained and procedures were not adequate to control repairs of defective concrete specifically: