

SSER

Task: Allegation A-146 and A-157

Reference Nos.: 4-84-A-06-41, 4-84-A-06-52

Characterization: It is alleged that deficiencies in Cadweld splicing records identified in nonconformance report (NCR) W3-6234 have not been properly dispositioned.

Assessment of Allegation: The NRC staff review of this matter indicated that as a result of concerns raised during the construction appraisal team (CAT) inspection in February and March of 1984, LP&L had reopened this report (NCR). The NCR was originally initiated on May 16, 1983 and contained several issues pertaining to Cadweld record deficiencies, uncertified Cadweld inspectors, and the implementation of Cadweld sampling procedures. The staff assessment of each item addressed in the NCR is as follows:

1. During the quality assurance (QA) record review Cadwelds of EBASCO identified 90 Cadwelds which had been removed for testing or which were visual rejects with incomplete records. The replacement splice numbers for these 90 had not been recorded in the comments column of the daily Cadweld inspection reports (DCIR), as required by EBASCO procedure W-SITP-4. The allegor was apparently concerned as to whether the replacement Cadwelds were actually installed in facility concrete structures.

EBASCO researched the Cadweld records and verified that information provided in the QA records for preplacement inspection and release for concrete placement indicated that installation of 85 out of the 90 Cadwelds in question had been documented on the preplacement inspection data forms and that the Cadwelds passed visual inspection. The relevant Cadweld maps indicated that the remaining five, which had apparently been designated for cut out, had replacement splices installed. Based on this information, the NRC staff believes that the Cadwelds removed for testing or as visual rejects were replaced.

The NRC staff also reviewed the procedure used to verify the status of a Cadweld. A color coding system was used to designate splices to be accepted, those to be tested and those to be rejected. Maps were also made which generally reflected the location of all splices. The NRC staff found no evidence of missing splices.

2. This portion of the NCR addressed certification of J. A. Jones splice inspection personnel. (This issue is assessed in detail in Allegation A-110).
3. This portion of the NCR identified 43 Cadwelds that did not receive a final visual inspection by J. A. Jones inspectors. The NRC staff reviewed Attachment III to NCR W3-6234 and noted that 41 of the 43 Cadweld splices were production or sister splices that had been tensile tested and had met the minimum tensile strength requirements. The other

two Cadwelds were installed in the containment shield building without having received final visual inspection by a certified inspector and were not removed for tensile testing. The final inspection of these two splices was made by a trainee with six months experience who had conducted 504 presplice and postsplice inspections with no discrepancies.

Based on these findings, the NRC staff concluded that the structural capability of the two Cadwelds was adequate, and that even though they were not visually inspected by a certified Level I inspector, there is no reason to question their adequacy. The fact that they did not receive a final visual inspection does, however, indicate that EBASCO procedures were not being followed in all cases. Nevertheless, the NRC staff believes that these two splices do not represent a reduction in structural capability.

4. This portion of the NCR discusses the numerous Cadwelds that did not receive a final visual inspection by EBASCO personnel as required by the specification. The NRC staff reviewed the daily Cadweld inspection reports and verified that these Cadwelds had received final visual inspection by certified J. A. Jones inspectors. These daily Cadweld inspection reports were also reviewed by EBASCO QA personnel and found to be acceptable. Based on EBASCO review of a concrete preplacement checklist, all the Cadwelds in question were accepted for concrete placement. The NRC staff agreed with the acceptance of these Cadwelds. The NRC staff believes that while deviations in the specified inspection procedures occurred, there is no indication that the quality of the specific Cadwelds was impaired by not having had another level of inspection at the final stage by EBASCO.
5. Three specific areas were addressed in this section of the NCR: (1) the required sampling procedures following visual rejection of a Cadweld, (2) the use of sister splices to allow splicers to remain qualified for the three months when they are not active in production splicing, and (3) the adequacy of the overall sampling program implemented for specific structures.

The NRC staff reviewed disposition of the concern that sampling frequency of Cadwelds for tensile testing was not resumed for all positions and bar sizes after a Cadweld was visually rejected. The requirement to resume tensile test sampling for all bar sizes and positions was imposed by an EBASCO specification and not by an NRC Regulatory Guide or an industry standard. The EBASCO specification further states that the splicing crew should be requalified should two visual rejects occur in 15 consecutive splices. The NRC staff position regarding these issues is that a splice visually rejected should be replaced, but that no resumption of the tensile test sampling plan or requalification of splicers is required as a result of a visual reject unless there are repeated visual rejects.

Based on its review, the NRC staff concluded that the basis for the closure of the NCR was not adequate with respect to the EBASCO specification because the data presented in the NCR was not sufficient to determine if the tensile test sampling frequency was resumed after each visual reject. However, the staff also concluded that even if the sampling plan was not resumed, that fact did not constitute a violation of any NRC criterion. Regarding the issue of corrective action for rejected splices, a review of the records indicates that the rejection rate apparently never exceeded one in fifteen, and was generally much lower. Thus, corrective action was never required. The NRC staff believes that the data on this concern should be reviewed relative to the EBASCO specification.

The NRC staff also reviewed the concern over whether Cadwelders should use sister splices to remain qualified when they had done no production work for three months. The NRC staff does not disagree with this practice or with the disposition of the item by EBASCO.

The NRC staff attempted to review the Cadweld sampling program as applied to specific structures or structural elements, but the data have not been assembled as yet in this manner. Therefore, the sampling frequency required by the specification, as well as LP&L's commitments to comply with the guidelines in Regulatory Guide 1.10, were not verified as having been met.

6. This portion of the NCR discusses the fact that during the EBASCO QA record review, they found that some Cadwelds either were not addressed on a daily Cadweld inspection report or were not recorded on the Cadweld maps. The NRC staff was informed that subsequent to a sample QA review performed by the Quality Assurance Installation Review Group, a review of all J. A. Jones Cadweld records was completed which estimated that 14,685 Cadwelds were installed. Of these, 39 have records to indicate that they were installed, although their exact location along the reinforcing bar cannot be identified. Information contained in the concrete preplacement lists verified that all 39 Cadwelds were installed, inspected and accepted in the concrete placement. This is judged to be acceptable to the NRC since the exact location of a splice is generally required only until it has been determined the splices have all met the strength requirements based on the samples tested. Nevertheless, knowing the location of each Cadweld would aid if its removal became necessary.

Only 6 of the 14,685 Cadwelds on the Cadweld map were found not to have daily Cadweld inspection reports. All 6 Cadwelds were located in the structures inside the reactor containment building. The NRC staff review of the Cadweld records and test results indicated that only 263 out of 14,685 Cadwelds were visually rejected. At this rejection rate, probably none of the six would have been rejected. Moreover, the six are distributed throughout the interior structures and even if defective, would not contribute to any significant understrength. Had one had been a visual reject, test data indicate that even if an area twice as large as that used to reject splices was present, the splice would still meet the tensile test strength criterion.

Potential Violations: There is a violation of J. A. Jones procedure W-SITP-4 and the guidelines of NRC Regulatory Guide 1.10, which the project was using. Additionally, because of the failure to follow the procedures and maintain the records, LP&L is in violation of 10 CFR 50, Appendix B, Criterion V, which states that activities affecting quality shall be accomplished in accordance with prescribed procedures.

Actions Required: Prior to fuel loading, LP&L shall provide to the NRC staff the Cadweld data for the project in such a form that it can be readily compared to the Cadweld testing criteria. This will require that the Cadweld data be classified by building or structural element, such as the concrete basemat, NPIS walls not part of the RAB or FHB, and containment building interior structures. Additionally, the data shall be classified by test program type (production or sister), bar size, bar position and Cadwelder. Data shall be provided in each category on the sequence of splicing, on the total number of splices made on the, visual rejects, on production tests and failures, and on sister tests and failures. Data shall also be provided on welder qualification and requalification, including dates, bar size and bar position.

References

1. NCR W3-6234, nonconformance report on Cadwelds, May 16, 1983.
2. J. A. Jones procedure No. W-SITP-4, Revision 0, "Reinforced Steel-Handling, Storage, Installing, Cadwelding and Modification Inspection Procedures." October 3, 1975.
3. Ebasco Specification No. LOU-1564.79, Revision 0, "Mechanical Splicing of Concrete Reinforcing Steel," March 8, 1974.
4. U. S. AEC Regulatory Guide 1.10, Revision 1, "Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures," January 2, 1973.

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Task: Allegation A-146 and A-157

Reference Nos.: 4-84-A-06-41, 4-84-A-06-52

Characterization: It has been alleged that deficiencies in Cadweld splicing records identified in NCR W3-6234 have not been properly dispositioned.

Assessment of Allegation: The NRC staff review of this matter indicated that as a result of concerns raised during the CAT inspection effort in February and March of 1984, LP&L had reopened this nonconformance report (NCR).

The NCR addressing Cadweld records was originally initiated on May 16, 1983. The NCR contained several issues pertaining to Cadweld record deficiencies, uncertified Cadweld inspectors, and the implementation of Cadweld sampling procedures at Waterford. The NRC staff reviewed NCR W3-6234 and the various parts of the disposition. The assessment on each of the items which were addressed in the NCR is as follows:

1. During the Quality Assurance (QA) Cadweld record review Ebasco identified that 90 Cadwelds which had been removed for testing or were visual rejects (had incomplete records.) The replacement splice numbers for these 90 had not been recorded in the comments column of the daily Cadweld inspection reports (DCIR) as required by procedure W-SITP-4. The allegor was apparently concerned as whether the replacement Cadwelds were actually installed in the concrete structure.

Ebasco researched the Cadweld records and verified that information provided in the QA records, related to the preplacement inspection and release for concrete placement, indicated that installation of 85 out of the 90 Cadwelds in question had been documented on the preplacement inspection data forms and that the Cadwelds passed visual inspection.

The relevant Cadweld maps indicated that the remaining 5, which had apparently been designated for cut out, had replacement splices installed. Based on this information, the NRC staff believes that those Cadwelds which were removed for testing or as visual rejects were replaced.

The NRC staff also reviewed the procedure which was utilized to prevent problems with identification of the status of a Cadweld. A color coding system was used to designate accepted splices, splices to be tested and those rejected, and maps of splice locations were made which generally reflect the location of all splices. The NRC staff review indicated no evidence of missing splices.

2. This portion of the NCR addressed the question of certification of splice inspection personnel of J. A. Jones. (This subject is addressed in the SSER on the allegation pertaining to A-110, A-130, and A-148.)
3. There were 43 Cadwelds identified that did not receive a final visual inspection by J. A. Jones inspectors. The NRC staff reviewed Attachment III to NCR W3-6234 and noted that 41 of the 43 Cadwelds splices production or sister splices that were tensile tested. Test results of these Cadweld splices met the required minimum ultimate tensile strength. The other two Cadwelds were installed in the containment shield building without receiving final visual inspection by certified inspector. These were not removed for tensile testing. The final inspection was made on these 2 by a trainee with 6 months experience in conducting 504 preweld and postweld inspections with no discrepancies found in the trainee's work.

Based on these facts, the NRC staff concluded that the structural capability of the 2 Cadwelds was adequate, and even though there was no final visual inspection completed by a certified Level I inspector, there is not reason to question the splices' adequacy. The instances of the missed final visual inspections do, however, indicate that the procedures were not being followed in all cases. The NRC staff believes that the two Cadweld splices which were left in the structure, but not visually inspection represent no reduction in structural capability.

4. There were numerous Cadwelds identified that did not receive a final visual inspection by Ebasco personnel as required by the specification. The NRC staff reviewed the daily Cadweld inspection reports and it was verified that these Cadwelds had however, received final inspection by J. A. Jones certified inspectors. These same daily Cadweld inspection reports were also reviewed by Ebasco QA personnel and found to be acceptable. Based on review of concrete pre-placement check list, all the Cadwelds in question were accepted for concrete placement. The NRC staff agreed with the acceptance of these Cadwelds. The NRC staff agreed with the acceptance of the specification inspection procedures occurred. there is no indication that the quality of the specific Cadwelds was impaired by not having had the second level of inspection at the final stage by Ebasco.

5. Three specific areas were addressed in this section of the NCR: These areas involved (1) the required sampling procedures following visual reject of a Cadweld, (2) the use of sister splices to maintain splicer qualifications during periods when they are not active in production splicing, and (3) the adequacy of the overall sampling program implemented for specific structures.

The NRC staff reviewed the disposition of the concern that sampling of Cadwelds for tensile testing was not started anew for all positions and bar sizes after a Cadwelder had a visual reject. The requirement to restart the tensile test sampling plan for all bar sizes and positions was imposed by an Ebasco specification not the NRC Regulatory Guide or industry standard. The Ebasco specification further states that the splicing team should be requalified in the event of two visual rejects in 15 consecutive splicer. The NRC staff's position regarding these issues is that a visual reject should be replaced but that no restart of the tensile test sampling plan or requalification of splicers is required as a result of a visual reject unless there are consistently visual rejects.

The staff has further stated that some corrective action should be taken in the event that visual rejects become a habitual occurrence. Based on its review, the NRC staff concluded that the basis for the closure of the NCR was not adequate with respect to the Ebasco specification because the data presented in the NCR was not sufficient to determine if the tensile test sampling plan was started anew after each visual reject. However, the staff also concluded that in the event the sampling plan was not restarted it would not constitute a violation of NRC criteria. Regarding the issue of corrective action in the event of continual visual rejects, a review of the records indicates that the visual rejection rate never exceeded one in fifteen and was generally much lower. Thus, this action never was required. The NRC CAT team action on this issue have resulted in the reopening of the NCR and the Task Force believes that the entire set of data needs to be put in a form for review relative to the Ebasco specifications.

The NRC staff reviewed the concern over Cadwelders using sister splices as a means to keep Cadwelders qualified when no production work had been done by the Cadwelder for a period of these months, and none was being done on the expiration dated. The NRC staff does not disagree with this practice or the disposition of the item by Ebasco.

The NRC staff attempted to review the Cadweld testing program as applied to specific structures or structural elements, but the data have not been assembled as yet in this manner. Therefore, the frequency of testing required by the specification, as well as the regulatory commitments was not verified as having been met. This matter will be considered an open issue.

6. During the Ebasco QA record review for Cadwelds, it was found that some Cadwelds either were not addressed on a daily Cadweld inspection report or were not recorded on the Cadweld maps. The NRC staff has been informed that subsequent to a sample QA review, a 100% review of J. A. Jones Cadweld records was performed by the Quality Assurance Installation Review Group. It was estimated that total of 14,685 Cadwelds were installed. Of these there were 39 Cadwelds for which a record exists to indicate that they were installed, but their exact location along the reinforcing bar being spliced can not be identified. Information contained in the preplacement lists verified that all of the 39 Cadwelds were installed, inspected and accepted in the concrete placement. This is judged to be acceptable to the NRC since the exact location of a splicer is generally required only for the length of time until it has been determined the splices have all met the strength requirements based on the test samples. Although locations would aid removal if that became necessary.

It was found that only 6 Cadwelds out of the 14,685 which appeared on a Cadweld map did not have daily Cadweld inspection reports. All of the 6 Cadwelds were located in the Reactor Containment Building. The NRC staff review of the Cadweld records and test results provide the staff with sufficient confidence that the missing visual inspection reports for these 6 splices do not lead to a concern over the adequacy of the Cadwelds.

The low frequency rate of visual rejection (263 out of 14,685) would lead one to conclude that probably none of the 6 would have been a visual reject. It should be noted that the 6 are widely distributed in the facility and can not contribute to any significant understrength.

If one were to hypothesize that one could have been a visual reject, the NRC staff is aware of test data which indicates a margin of 2 in the visual reject void area criteria so that there is no concern over the strength capability of these 6 Cadwelds.

Potential Violations: There is a violation of procedure W-SITP-4 and the requirements of Regulatory Guide 1.10, which the project was using. Additionally, because of the failure to follow the procedures and maintain the records the licensee is in violation of 10 CFR 50, Appendix B, Criterion V, which states that activities affecting quality shall be accomplished in accordance to prescribed procedures.

Actions Required: Prior to fuel loading the licensee shall provide the Cadweld data for the project in such a form that it can be readily compared to the testing criteria used for the Waterford 3 project. This will require breaking the Cadweld data down by building or structural element, such as the base mat, NPIS walls not part of RAB or FHB, containment interior structures, etc. Additionally, the data will be broken down by test program type (production or sister), bar size, bar position and Cadwelder. Data will be provided in each category on the sequence of splicing, total splices made, visual rejects, production tests and failures, and sister tests and failures. Data will also be provided on welder qualification and requalification including dates, bar size and bar position.

References

1. NCR W3-6234, nonconformance report on Cadwelds, May 16, 1983.
2. J. A. Jones procedure No. W-SITP-4, Revision 0, "Reinforced Steel-Handling, Storage, Installing, Cadwelding and Modification Inspection Procedures," October 3, 1975.
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Assessment of Allegation: The NRC staff review of this matter indicated that as a result of concerns raised during the construction appraisal team (CAT) inspection in February and March of 1984, LP&L had reopened this report (NCR). The NCR was originally initiated on May 16, 1983 and contained several issues pertaining to Cadweld record deficiencies, uncertified Cadweld inspectors, and the implementation of Cadweld sampling procedures. The staff assessment of each item addressed in the NCR is as follows:

1. During the quality assurance (QA) record review Cadwelds of EBASCO identified 90 Cadwelds which had been removed for testing or which were visual rejects with incomplete records. The replacement splice numbers for these 90 had not been recorded in the comments column of the daily Cadweld inspection reports (DCIR), as required by EBASCO procedure W-SITP-4. The allegor was apparently concerned as to whether the replacement Cadwelds were actually installed in facility concrete structures.

EBASCO researched the Cadweld records and verified that information provided in the QA records for preplacement inspection and release for concrete placement indicated that installation of 85 out of the 90 Cadwelds in question had been documented on the preplacement inspection data forms and that the Cadwelds passed visual inspection. The relevant Cadweld maps indicated that the remaining five, which had apparently been designated for cut out, had replacement splices installed. Based on this information, the NRC staff believes that the Cadwelds removed for testing or as visual rejects were replaced.

The NRC staff also reviewed the procedure used to verify the status of a Cadweld. A color coding system was used to designate splices to be accepted, those to be tested and those to be rejected. Maps were also made which generally reflected the location of all splices. The NRC staff found no evidence of missing splices.

2. This portion of the NCR addressed certification of J. A. Jones splice inspection personnel. (This issue is assessed in detail in Allegation A-110).
3. This portion of the NCR identified 43 Cadwelds that did not receive a final visual inspection by J. A. Jones inspectors. The NRC staff reviewed Attachment III to NCR W3-6234 and noted that 41 of the 43 Cadweld splices were production or sister splices that had been tensile tested and had met the minimum tensile strength requirements. The other

two Cadwelds were installed in the containment shield building without having received final visual inspection by a certified inspector and were not removed for tensile testing. The final inspection of these two splices was made by a trainee with six months experience who had conducted 504 presplice and postsplice inspections with no discrepancies.

Based on these findings, the NRC staff concluded that the structural capability of the two Cadwelds was adequate, and that even though they were not visually inspected by a certified Level I inspector, there is no reason to question their adequacy. The fact that they did not receive a final visual inspection does, however, indicate that EBASCO procedures were not being followed in all cases. Nevertheless, the NRC staff believes that these two splices do not represent a reduction in structural capability.

4. This portion of the NCR discusses the numerous Cadwelds that did not receive a final visual inspection by EBASCO personnel as required by the specification. The NRC staff reviewed the daily Cadweld inspection reports and verified that these Cadwelds had received final visual inspection by certified J. A. Jones inspectors. These daily Cadweld inspection reports were also reviewed by EBASCO QA personnel and found to be acceptable. Based on EBASCO review of a concrete preplacement checklist, all the Cadwelds in question were accepted for concrete placement. The NRC staff agreed with the acceptance of these Cadwelds. The NRC staff believes that while deviations in the specified inspection procedures occurred, there is no indication that the quality of the specific Cadwelds was impaired by not having had another level of inspection at the final stage by EBASCO.
5. Three specific areas were addressed in this section of the NCR: (1) the required sampling procedures following visual rejection of a Cadweld, (2) the use of sister splices to allow splicers to remain qualified for the three months when they are not active in production splicing, and (3) the adequacy of the overall sampling program implemented for specific structures.

The NRC staff reviewed disposition of the concern that sampling frequency of Cadwelds for tensile testing was not resumed for all positions and bar sizes after a Cadweld was visually rejected. The requirement to resume tensile test sampling for all bar sizes and positions was imposed by an EBASCO specification and not by an NRC Regulatory Guide or an industry standard. The EBASCO specification further states that the splicing crew should be requalified should two visual rejects occur in 15 consecutive splices. The NRC staff position regarding these issues is that a splice visually rejected should be replaced, but that no resumption of the tensile test sampling plan or requalification of splicers is required as a result of a visual reject unless there are repeated visual rejects.

Based on its review, the NRC staff concluded that the basis for the closure of the NCR was not adequate with respect to the EBASCO specification because the data presented in the NCR was not sufficient to determine if the tensile test sampling frequency was resumed after each visual reject. However, the staff also concluded that even if the sampling plan was not resumed, that fact did not constitute a violation of any NRC criterion. Regarding the issue of corrective action for rejected splices, a review of the records indicates that the rejection rate apparently never exceeded one in fifteen, and was generally much lower. Thus, corrective action was never required. The NRC staff believes that the data on this concern should be reviewed relative to the EBASCO specification.

The NRC staff also reviewed the concern over whether Cadwelders should use sister splices to remain qualified when they had done no production work for three months. The NRC staff does not disagree with this practice or with the disposition of the item by EBASCO.

The NRC staff attempted to review the Cadweld sampling program as applied to specific structures or structural elements, but the data have not been assembled as yet in this manner. Therefore, the sampling frequency required by the specification, as well as LP&L's commitments to comply with the guidelines in Regulatory Guide 1.10, were not verified as having been met.

6. This portion of the NCR discusses the fact that during the EBASCO QA record review, they found that some Cadwelds either were not addressed on a daily Cadweld inspection report or were not recorded on the Cadweld maps. The NRC staff was informed that subsequent to a sample QA review performed by the Quality Assurance Installation Review Group, a review of all J. A. Jones Cadweld records was completed which estimated that 14,685 Cadwelds were installed. Of these, 39 have records to indicate that they were installed, although their exact location along the reinforcing bar cannot be identified. Information contained in the concrete preplacement lists verified that all 39 Cadwelds were installed, inspected and accepted in the concrete placement. This is judged to be acceptable to the NRC since the exact location of a splice is generally required only until it has been determined the splices have all met the strength requirements based on the samples tested. Nevertheless, knowing the location of each Cadweld would aid if its removal became necessary.

Only 6 of the 14,685 Cadwelds on the Cadweld map were found not to have daily Cadweld inspection reports. All 6 Cadwelds were located in the structures inside the reactor containment building. The NRC staff review of the Cadweld records and test results indicated that only 263 out of 14,685 Cadwelds were visually rejected. At this rejection rate, probably none of the six would have been rejected. Moreover, the six are distributed throughout the interior structures and even if defective, would not contribute to any significant understrength. Had one had been a visual reject, test data indicate that even if an area twice as large as that used to reject splices was present, the splice would still meet the tensile test strength criterion.

Potential Violations: There is a violation of J. A. Jones procedure W-SITP-4 and the guidelines of NRC Regulatory Guide 1.10, which the project was using. Additionally, because of the failure to follow the procedures and maintain the records, LP&L is in violation of 10 CFR 50, Appendix B, Criterion V, which states that activities affecting quality shall be accomplished in accordance with prescribed procedures.

Actions Required: Prior to fuel loading, LP&L shall provide to the NRC staff the Cadweld data for the project in such a form that it can be readily compared to the Cadweld testing criteria. This will require that the Cadweld data be classified by building or structural element, such as the concrete basemat, NPIS walls not part of the RAB or FHB, and containment building interior structures. Additionally, the data shall be classified by test program type (production or sister), bar size, bar position and Cadwelder. Data shall be provided in each category on the sequence of splicing, on the total number of splices made on the, visual rejects, on production tests and failures, and on sister tests and failures. Data shall also be provided on welder qualification and requalification, including dates, bar size and bar position.

References

1. NCR W3-6234, nonconformance report on Cadwelds, May 16, 1983.
2. J. A. Jones procedure No. W-SITP-4, Revision 0, "Reinforced Steel-Handling, Storage, Installing, Cadwelding and Modification Inspection Procedures," October 3, 1975.
3. Ebasco Specification No. LOU-1564.79, Revision 0, "Mechanical Splicing of Concrete Reinforcing Steel," March 8, 1974.
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