

VENDOR INSPECTION REPORT

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

Report No. 99900017/78-01

Program No. 44020

Company: Dravo Corporation  
Pipe Fabrication Division  
1115 Gilman Street  
Marietta, Ohio 45750

Inspection Conducted: April 10-13, 1978

Inspectors: D M Hunnicutt 5/18/78  
for I. Barnes, Contractor Inspector, Vendor  
Inspection Branch Date

D M Hunnicutt 5/18/78  
for H. W. Roberds, Contractor Inspector, Vendor  
Inspection Branch Date

D M Hunnicutt 5/18/78  
for P. I. Verrios, Contractor Inspector, Vendor  
Inspection Branch Date

Approved by: D M Hunnicutt 5/18/78  
D. M. Hunnicutt, Acting Chief, Vendor  
Inspection Branch Date

Summary

Inspection on April 10-13, 1978 (99900017/78-01)

Areas Inspected: Implementation of 10 CFR 50, Appendix B, criteria and applicable codes and standards, including control of production welding; elevated temperature heat treatment; nondestructive examination (dye penetrant); material control; internal audits; procurement control (vendor audits); design and document control; nonconforming materials, parts or components; equipment calibration and action on previous inspection findings. The inspection involved seventy-five (75) inspector-hours on site by three (3) NRC inspectors.

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Results: In the ten (10) areas inspected, no apparent deviations or unresolved items were identified in two (2) areas; the following were identified in the remaining areas.

Deviations: Action on Previous Inspection Findings - Completion of Weld Joint Data cards by welding foremen not consistent with corrective action commitments (Enclosure, Item A.); failure to prepare a General Welding Specification relative to tack welding in accordance with corrective action commitments (Enclosure, Item B.); failure to include a certain NRC finding in an audit checklist of production activities in accordance with corrective action commitments (Enclosure, Item C.); failure to make a QA Manual revision in accordance with corrective action commitments (Enclosure, Item E.); failure to make a QA Manual revision in accordance with corrective action commitments (Enclosure, Item F.); failure to write and implement a procedure in accordance with corrective action commitments (Enclosure, Item G.); failure to impose the specified procedure relative to vendor audits in accordance with corrective action commitments (Enclosure, Item J.). Control of Production Welding - Control of certain welding power sources with regards amperage output not consistent with the requirements of Criterion IX of 10 CFR 50, Appendix B, and paragraph NA-4451 of the ASME Code (Enclosure, Item D.). Nondestructive Examination (Dye Penetrant) - Control of penetrant materials not consistent with Criterion IX of 10 CFR 50, Appendix B, and Article 6 of the ASME Code Section V (Enclosure, Item H.); qualification of Level III NDE personnel not consistent with Criterion V of 10 CFR 50, Appendix B, and paragraphs NB/NC and ND-5521 in the ASME Code (Enclosure, Item I.). Internal Audits - Contrary to Criterion XVIII of 10 CFR 50, Appendix B, certain internal audits had not been performed (Enclosure, Item K.); contrary to Criterion XVIII of 10 CFR 50, Appendix B, results of internal audits were not distributed to Chief Inspector and to the Authorized Inspector (Enclosure, Item L.). Design Control - Contrary to Criterion III of 10 CFR 50, Appendix B, sketches were not checked initialed, or dated by one other individual in Engineering (Enclosure, Item M.); contrary to Criterion III of 10 CFR 50, Appendix B, spool detail sheets for class 2 piping had been released for fabrication without prior approval as required by Customer Specification (Enclosure, Item N.). Nonconformances and Corrective Action - Contrary to the requirements in Section 14 of the QA Manual, certain nonconformance reports had not been presented to the Authorized Nuclear Inspector (Enclosure, Item O.); contrary to Criterion XV of 10 CFR 50, Appendix B, certain materials with discrepant CMTR's were not red tagged or trouble tagged (Enclosure, Item P.). Equipment calibration - contrary to Criterion XII of 10 CFR 50, Appendix B, certain masters are not traceable to the national standards, in that they have been removed from the calibration program (Enclosure, Item Q.).

Unresolved Items: External Audits (Vendor audits) - Based on the subjective wording of the Dravo Quality Assurance Manual, the area of vendor audits is not auditable. (Details Section III, paragraph D.3.b.)

DETAILS SECTION I

(Prepared by I. Barnes)

A. Persons Contacted

- \*G. Schwab, Vice President and General Manager
- \*W. A. Molvie, QA Manager and Chief Engineer
- \*E. R. Dysent, Operations Manager
- \*R. L. Anderson, QA Supervisor
- \*R. L. Davis, Welding Engineer
- L. Dean, Project Supervisor
- \*D. Gilchrist, QA Engineer
- \*J. Llewellyn, Project Engineer
- R. L. Miller, QA Engineer
- \*J. Moore, Chief Inspector
- \*P. P. Norris, Chief Metallurgist
- \*L. W. Stiles, Project Supervisor
- \*W. Smith, Authorized Nuclear Inspector, Hartford Steam Boiler  
Inspection and Insurance Company
- \*T. J. Whitacre, QA Engineer

\*Attended exit meeting.

B. Action on Previous Inspection Findings

1. (Closed) Deviation (Report No. 77-01, Details Section I, paragraph D.3.a.(1)): Performance of shielded metal arc welding with 1/8 in. E7018 electrodes at amperage values above the range specified by the applicable welding procedure specification.

The inspector verified that the committed Weld Engineering review of welding procedures had been performed, monthly audits of welding operations had been implemented and that the foremen had received instructions relative to this item.

The inspector ascertained, however, that current use of Weld Joint Data cards was not in accordance with committed corrective actions. (See Enclosure, Item A).

2. (Closed) Deviations (Report No. 77-01, Details Section I, paragraphs D.3.a.(3), (4) and (5)).



The inspector verified that the committed instructions had been given and that Standard Procedure, SP-3 had been appropriately revised with respect to performance of base material weld repairs and distributed.

3. (Closed) Deviation (Report No. 77-02, Details Section I, paragraph C.3.a(1)): Performance of tack welding without a color coded process form having been issued to or in the possession of the selected operator.

The inspector verified by review of current production welding records that committed corrective action had been implemented with respect to control of tack welding by use of Weld Joint Data cards. It was also established that monthly audits by Weld Engineering now included tack welding.

The inspector ascertained, however, that all corrective actions had not been completed as committed. (See Enclosure, Item B.).

4. (Closed) Deviation (Report No. 77-02, Details Section I, paragraph C.3.a.(2)): Use of Weld Joint Data cards observed to be at variance with the requirements of applicable qualified welding procedures.

The inspector verified that use of preprinted Weld Joint Data cards had been discontinued and that parameters were now being recorded on blank cards from the specific welding procedure specification being used.

5. (Closed) Deviation (Report No. 77-02, Details Section I, paragraph C.3.a.(3)): Absence of evidence on Quality Control and Assurance Data Sheet that required fit-up inspection had been performed, although welding was observed by the inspector being completed.

The inspector verified that the committed training had been performed.

The inspector ascertained, however, that the corrective action to preclude recurrence had not been implemented as committed (See Enclosure, Item C.)



6. (Closed) Deviation (Report No. 77-02, Details Section I, paragraph C.3.a.(5)): Absence of records to allow verification, that specific provisions of the ASME Code with respect to preheat and interpass temperature and cooling rate from the post-weld heat treatment temperature range, were complied with in qualification of certain welding materials for ASME Section III application.

The inspector verified that the committed corrective actions had been implemented with respect to review and upgrading of welding materials and that procedure, GWS-4, Revision 0, had been transmitted to the Quality Assurance Department.

7. (Closed) Unresolved Item (Report No. 77-02, Details Section I, paragraph I.C.3.b.): Approval of WPS 1-1-A1502-P7, Revision 1, for Job No. E-2803 with a supporting procedure qualification record showing one tensile strength value of 61,550 p.s.i. with failure in the weld.

The inspector verified that the Dravo response was correct with respect to ASME Section III and Section IX requirements.

C. Control of Production Welding

1. Objective

The objectives of this area of the inspection were to verify that production welding was controlled in accordance with applicable NRC and ASME Code requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of QA Manual, Section 9 Revision 3, "Control of Special Processes."
- b. Review of fabrication requirements in customer specifications 9763-006-248-1, Revision 2; and 10466-M-201 A, Revision 9.
- c. Observation of two (2) hot wire gas tungsten arc and one shielded metal arc production welding operations.

- d. Review of Weld Joint Data cards supplied to welders for operations witnessed and a comparison against requirements of the applicable welding procedure specifications.
- e. Examination of components identified in c. above relative to fabrication status denoted by applicable Quality Control and Assurance Data Sheets.
- f. Examination of Welding Engineering surveillance records for production welding operations.
- g. Review of fabrication records for three (3) recently completed assemblies.

3. Findings

a. Deviation from Commitment

See Enclosure, Item D.

b. Unresolved Items

None.

D. Elevated Temperature Heat Treatment

1. Objectives

The objectives of this area of the inspection were to verify that elevated temperature heat treatment was performed in accordance with written procedures and that the procedures were consistent with applicable NRC and material specification requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of QA Manual, Section 9 Revision 3, "Control of Special Processes."
- b. Review of audit report for approved vendor utilized for solution annealing of austenitic stainless steels.
- c. Examination of heat treatment records for Job No. 3002, Sketch 7.

- d. Review of applicable customer solution annealing requirements.

3. Findings

Within this area of the inspection, no deviations or unresolved items were identified.

E. Exit Meeting

A post inspection meeting was held on April 13, 1978, with the management representative denoted in paragraph A. above. The inspectors summarized the scope and findings of the inspection. Management was also advised that a recommendation would be made, as a result of the continuing failure of Dravo to fulfill QA program commitments, for referral of the inspection findings to IE Headquarters for determination of required enforcement actions. Management comments were related to both clarification of the findings and a discussion of the monthly meetings, which had been instituted in November, 1977, for the purpose of strengthening awareness and implementation of QA program requirements.



DETAILS SECTION II

(Prepared by H. W. Roberds)

A. Persons Contacted

R. L. Anderson, QA Supervisor  
J. Moore, Chief Inspector  
D. S. Gilchrist, QA Engineer  
R. Kemp, Welding Foreman  
D. L. Walker, NDE Level II  
R. L. Davis, Welding Engineer

B. Action on Previous Inspection Findings

1. (Closed) Deviation II.C.3.a.(1) (Report No. 77-02): It was verified that a check of documentation was being made prior to final inspection to assure that the specific weld material and weld operator identification number was entered in the appropriate box on the sketch.

The inspector ascertained, however, that all corrective actions had not been completed as committed. (See Enclosure, Item E).

2. (Closed) Deviation II.C.3.a.(2) (Report No. 77-02): It was verified that Weld Engineering had made provisions for checking the entry of the weldors stamp number on the weld joint data form.
3. (Closed) Deviation II.C.3.a.(3) (Report No. 77-02): It was verified that a review of the weld procedures had been made prior to January 27, 1978.
4. (Closed) Deviation II.C.3.a.(4) (Report No. 77-02): It was verified that nondestructive examination procedures and revisions were recorded on specific back-up shop documents.

The inspector ascertained, however, that all corrective actions had not been completed as committed (See Enclosure Item F).

5. (Closed) Deviation II.C.3.a.(5) (Report No. 77-02): It was verified that a procedure had been written that delineated applicable records to be accumulated for review by the ANI prior to execution of the code data report.

The inspector ascertained, however, that all corrective actions had not been implemented as committed (See Enclosure Item G).

6. (Open) Deviation II.C.3.a.(6) (Report No. 77-02): Written instructions had not been formalized or issued to production relative to ANI Hold Points to assure compliance with Section 10 of the QA Manual requirements.

C. Nondestructive Examination (Dye Penetrant)

1. Objectives

The objectives of this area of the inspection were to verify that:

- a. Nondestructive examination is performed in accordance with approved procedures.
- b. Nondestructive examination procedures meet the requirements of Section V of the ASME Code.
- c. Test results are interpreted by qualified personnel.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of section 9 of the QA Manual.
- b. Review of Liquid Penetrant Inspection Procedure ASME III DP.
- c. Review of NDE Training and Certification Program for level I and II.
- d. Observation of work in progress.
- e. Interviews with cognizant personnel.

3. Findings

a. Deviations

- (1) See Enclosure Item H.
- (2) See Enclosure Item I.

b. Unresolved Items

None.

c. General Comment

Due to work not being performed on code related items in the methods of UT, MT and RT these methods are deferred until the next scheduled inspection.

D. Material Control

1. Objectives

The objectives of this area of the inspection were to verify that procedures and instructions have been established to implement a system for material control and identification in accordance with applicable regulatory, code and contract requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of Section 7 and 8 of the QA Manual.
- b. Verification of material identification from the component to the material records.
- c. Selective review of records of purchased materials.
- d. Interviews with cognizant personnel.

3. Findings

Within this area of the inspection, no deviations or unresolved items were identified.



DETAILS SECTION III

(Prepared by P. I. Verrios)

A. Persons Contacted

J. Moore, Chief Inspector  
D. Berrows, Receiving Supervisor  
C. Wilhelm, QA Technician  
D. Gilchrist, QA Engineer  
L. Stiles, Project Engineer  
G. Sears, Foreman Shop #2  
E. Stilgembayer, Production Manager  
A. Hiemer, Squad Leader  
L. Dean, Project Supervisor.

B. Action on Previous Inspection Findings

1. (Closed) Deviation No. III.D.3.a (Report No. 77-02): The inspector verified that Dravo has implemented the committed corrective action relative to vendor audits.

The inspector determined that the committed steps to preclude recurrence had not been implemented. (See Enclosure, Item J).

2. (Closed) Deviation No. III.E.3.a.(1) (Report No. 77-02): The inspector verified that Dravo has implemented the committed corrective action.

C. Internal Audits

1. Objectives

The purpose of this inspection was to verify that:

- a. Procedures or policy documents clearly identify organizations responsible for audits and define their responsibilities and authorities.
- b. Measures have been established to assure that auditors are independent of any direct responsibility for performance of activities which they are auditing and that persons having direct responsibility for performance of the activities being audited are not involved in the selection of the audit team.

- c. All auditing personnel, including technical specialists, are required to receive appropriate training or orientation to develop their competence for performing required audits.
- d. Guidelines and requirements are established for audit scheduling and that they take into consideration the status and importance of the activities to be audited.
- e. Sufficient instructions or guidance are available to the auditors in the form of checklists or procedures to perform the audits effectively and in accordance with the audit plan.
- f. Deficiencies identified by the audits are closed out by appropriate corrective action and timely follow-up, including reaudit of deficient areas.
- g. Audit records are collected, stored and maintained in accordance with applicable code and contract requirements.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of Section 17 of the QA Manual, Revision 3.
- b. Review of the following internal audits:
  - Audit of Engineering Department.
  - Audit of Quality Assurance.
  - Audit of Inspection Department.
  - Audit of Purchasing Department.
  - Audit of Weld Engineering and Production Welding.
- c. Interviews with cognizant personnel.

3. Findings

- a. Deviation
  - (1) See Enclosure, Item K.
  - (2) See Enclosure, Item L.
- b. Unresolved Items
  - None.

D. Procurement Control (Vendor Audits)

1. Objectives

The purpose of this inspection was to verify that:

- a. Written procedures for this activity are available and in use.
- b. Evaluations were performed prior to award of contracts and at the specified frequency.
- c. Sufficient instructions or guidance is available to the auditors in the form of checklists or procedures to perform the audits effectively and in accordance with the audit plan.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of Section 7 of the QA Manual revisions 2 and 3.
- b. Review of Section 17 of the QA Manual Revision 3.
- c. Review of the Qualified Vendor List dated March 24, 1977.
- d. Review of twenty-five (25) randomly selected Approved Vendor files.
- e. Interviews with cognizant personnel.

3. Findings

a. Deviations

None.

b. Unresolved Items

Criterion VII of Appendix B to 10 CFR 50 states in part, ". . . The effectiveness of the control of quality by contractors and subcontractors shall be assessed by the applicant or designee at intervals consistent with the importance, complexity, and quantity of the product or services."



Section 17 of the Quality Assurance Manual Revision 3, paragraph 4.1 states, "When required, the quality assurance manual, procedures, operations, facilities, etc. of Dravo vendors shall be audited to assure that they comply with the ASME III Code, the applicable regulatory requirements and other applicable standards that may be invoked by customer requirements." Also same section paragraph 4.5 states, "When a vendor has a valid ASME Certificate issued by the Society, Dravo may, at its option waive the requirement for an in-plant audit of the vendor."

Based on the subjective wording of Dravo Quality Assurance Manual the area of external audits is not auditable.

E. Design and Document Control

1. Objectives

The objectives of this area of the inspection were to:

- a. Verify that the overall designs, including calculations, material selection, stress analysis reports, are reviewed for compliance with the design specification and code requirements.
- b. Verify that the reviews and checking of the design documents are performed by qualified personnel other than those responsible for the original.
- c. Verify that revisions, changes, and/or addenda to design documents are reviewed in the same manner as the original.
- d. Verify that the reviews and checks of design documents are appropriately documented in a manner that is auditable.
- e. Verify that procedures are implemented for the review, approval, release and distribution of design documents including changes thereto, by participating design organizations.
- f. Verify that measures established require that any deviations from the design document identified by in-process or final inspections, be reported to the responsible design organization for review, evaluation and appropriate disposition.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the QA Manual, Section 3, revision 3.
- b. Review of Specification 10855-P-201 (Q).
- c. Review of specification 10855-G-001.
- d. Review of fifty-five (55) randomly selected sketches.
- e. Interviews with Engineering and shop personnel.

3. Findings

a. Deviations

- (1) See Enclosure, Item M.
- (2) See Enclosure, Item N.

b. Unresolved Items

None.

F. Nonconforming Materials, Parts or Components

1. Objectives

The purpose of this inspection was to verify that:

- a. A system has been established for identifying and reporting nonconformances.
- b. The system for nonconformance identification contains, as a minimum, the following elements:
  - (1) Identification of item.
  - (2) Description of nonconformance.
  - (3) Segregation of the item, as appropriate.
  - (4) Signature of the reporting party.

- c. The assigned responsibilities are carried out by the designated persons.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the QA Manual, Section 14, Revision 3.
- b. Review of the QA Manual, Section 8, Revision 3.
- c. Review of twenty-five (25) randomly selected CMTR'S
- d. Review of fifty (50) randomly selected NCR's.
- e. Observation of designated segregation and hold areas.
- f. Interviews with cognizant personnel.

3. Findings

a. Deviations

- (1) See Enclosure, Item O.
- (2) See Enclosure, Item P.

b. Unresolved Items

None.

G. Equipment Calibration

1. Objectives

The purpose of this inspection was to verify that:

- a. A system has been established and is maintained to assure that tools, gages, instruments and other measuring devices used in activities affecting quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within specified limits.
- b. Calibration records are kept for each instrument and that these records include the following information:



- (1) Purchase date and calibration history.
- (2) Accuracy required and calibration results.
- (3) Location for use.
- (4) Present calibration interval and date due.
- (5) All maintenance and repair details.
- (6) Persons or agency performing all calibration.
- (7) Serial number or identification of each standard used to perform the calibration.
- (8) Number or name of the calibration procedure.
- (9) Environmental conditions used during calibration.
- (10) Equipment recall schedules.

2. Method of Accomplishment

The preceding objectives were accomplished by:

- a. Review of the QA Manual Section 11, Revision 3.
- b. Review of Standard Procedure No. 107, Revision 3.
- c. Verification of calibration status of twenty-five (25) randomly selected outside Micrometers, Calipers, master blocks, depth micrometers, and inside micrometers.

3. Findings

a. Deviations

See Enclosure, Item Q.

b. Unresolved Items

None.

DETAILS SECTION IV

(Prepared by D. M. Hunnicutt)

Management Meeting

A meeting was held in the NRC Offices, Bethesda, Maryland, on May 8, 1978, at the request of NRC to discuss Dravo Corporation's (Dravo) history of failure to meet NRC requirements, their responses to identified deviations, and their failure to fully implement their Quality Assurance Program. Those in attendance were:

DRAVO

Mr. G. Schwab, Vice President and General Manager  
Mr. R. L. Anderson, QA Supervisor  
Mr. W. A. Molvie, QA Manager and Chief Engineer

NRC

Mr. N. C. Mosley, Director, RCI  
Mr. G. W. Reinmuth, Assistant Director, RCI  
Mr. K. V. Seyfrit, Assistant Director, ROI  
Mr. U. Potapovs, Section Leader, Materials Integrity Section, NRR  
Mr. D. M. Hunnicutt, Acting Chief, VIB

Mr. Moseley stated that Dravo had failed to take necessary corrective actions to alleviate problem areas and had failed to fully implement their Quality Assurance Program, as demonstrated by the results of the last four inspections covering a two year period. Mr. Moseley stated that the findings included lack of corrective actions on identified deviations, failure to meet commitments made by Dravo management, and repeat deviations in the same areas as previously identified deviations.

Mr. Schwab stated that Dravo management was aware of the identified problems. He said that several of the problems were related to major contracts that had been in effect since the early 1970's. Mr. Schwab stated that the production staff was oriented towards the production of acceptable hardware and the specific job requirements, but had not carried through on the documentation of work related to the hardware fabrication. Mr. Schwab stated that significant progress has been made towards refining procedures and improving internal audits. He also reported the assignment of a welding engineer, who will check the welding machine setup and welder adherence to procedures.

Mr. Moseley stated that NRC expected to see the Dravo Quality Assurance Program, including auditing, identify and correct problems prior to NRC identification of these deficiencies.

Mr. Anderson stated that the Quality Assurance staff has increased in size, has an internal audit program, and that the general Quality Assurance attitude has shown improvement. Mr. Anderson stated that the internal audit program should be fully effective by early July.

Mr. Schwab stated that the ASME had been contacted and that the ASME would serve as an additional source of audit and would participate in corrective action follow-up at Dravo.

Mr. Schwab stated that Dravo will establish a plan to complete corrective actions related to previously identified NRC deviations and items identified by Dravo during their internal audits.

NRC stated that the program outlined by Dravo appeared to have the elements necessary to achieve correction of identified problems, if properly implemented. Dravo was also told that NRC inspections would be scheduled in the near future to determine the effectiveness of the Dravo program.