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

Report No. 99900524/79-02

Program No. 51200

Company: Gibbs and Hill Incorporated 393 Seventh Avenue New York, New York 10001

Inspection Conducted: July 9-13, 1979

Inspectors: TZ. H. TJuckley R. H. Brickley, Principal Inspector Program Evaluation Section Vendor Inspection Branch

R. L. Brown, Principal Inspector

R. L. Brown, Principal Inspect Program Evaluation Section Vendor Inspection Branch

J. R. Costello, Principal Inspector Program Evaluation Section Vendor Inspection Branch

Approved by:

C. J. Hale, Chief, Program Evaluation Section Vendor Inspection Branch

Summary

Inspection on July 9-13, 1979 (99900524/79-02)

<u>Area. Inspected</u>: Implementation of 10 CFR 50, Ar andix B, criteria involving design inspection, design change control, design process management, development of GIBBSAR, action on previous inspection findings, and actions on a potential 10 CFR 21 item. The inspection involved ninety (90) inspector hours on site by three (3) NRC inspectors.

Results: In the six (6) areas inspected there were no unresolved items identified in any of the areas, no deviations identified in five (5) of

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the areas, and a deviation was identified in the remaining area:

Deviation: Design process management - failure to follow procedures in indicating the revised text on a revision to a procedure.

DETAILS SECTION I (Prepared by R. H. Brickley)

A. Persons Contacted

- B. J. Benderski, Nuclear Engineer
- D. J. Castro, Supervisory Instrumentation Engineer
- *N. I. Hyman, Manager, QA
- J. Trons, Senior Engineer
- D. Mirkovic, Associate Engineer
- H. D. Ricevuto, QA Engineer
- . Triolo, Senior CA Engineer

*Denotes attendance at the exit interview

B. Action on Previous Inspection Findings

- (Closed) Deviation (Report No. 78-02) Personnel not attending the Nuclear Engineering Course as required by procedure. The inspector examined the corrective action and preventive measures described in the letter of response dated February 8, 1979, i.e., Revision 3 to procedure QAI-02 (Procedure for Indoctrination and Training) dated April 1979 which allows discipline Chief Engineers to exempt their personnel from attending the in-house Nuclear Engineering Course based on the individual's experience and training.
- 2. (Closed) Deviation (Report No. 79-01) Design Descriptions (Technical Descriptions) do not specify the issue date of applicable codes and standards. The inspector examined the corrective action and preventive measures described in the letter of response dated May 2, 1979, i.e., Revision 4 to procedure DC-2 (Design Description Procedure) dated May 1979 which requires that the Purchase Order specify the issue date of codes and standards and, records of a seminar (attendance list, outline, etc.) conducted on July 9, 1979, for Job Engineers on this subject.
- 3. (Closed) Deviation (Report No. 79-01) A completed design review checklist from the review of Calculation No. 2323-NC-AA-05 (LOCA Analysis) was not submitted to the QA Engineer. The inspector examined the corrective action and preventive measures described in the letter of response dated May 2, 1979, i.e., the Design Review-Calculations-Record Form dated May 4, 1979, and its completed attachment Nuclear Checklist-Calculations, records of a seminar (attendance list, outline, etc.) conducted on June 27, 1979

for Design Reviewers on this subject, and Addit Report No. 1 dated May 10, 1979, which covered implementation of procedure DC-10 (Design Review Procedure-Calculations).

4. (Closed) Unresolved Item (Report No. 79-01) It was not apparent that the title, preparation, contents and implementation of the External Design Interface Document met the requirements of Section 2.0 (External Design Interfaces) of procedure DC-13 (Procedure for Identification and Control of Design Interfaces, Both External and Internal), Revision 1. The inspector examined the corrective action and preventive measures described in the letter of response dated May 2, 1979, i.e., Revision 2 to DC-13 dated May 1979 which deleted the requirements for a separate External Design Interface Document and identifies the Project Guide as the document covering these activities, and the scheduling of a seminar on July 25, 1979 on this subject.

C. Rosemont Pressure Switches

1.

Rosemont, Inc. recently identified to a licensee (Comanche Peak) a problem with the lift-off voltage requirement for the 1153 Series-A pressure transmitter. Under certain operating conditions; such as a suppressed zero, ranged down span, low input pressure and low ambient operating temperature; the transmitter may not start-up when 12VDC power is applied (it may require as much as 30VDC to start-up). The problem only affects the start-up. Once started it will function properly under the specified conditions with a minimum power supply of 12VDC.

A G & H letter to the licensee dated July 3, 1979 identified those 1153 Series-A pressure transmitters supplied under Purchase Order CP-0611A. Their investigation of the application of these units concluded that the instruments are passive I&C equipment that perform no active safety function and that they have limited QA requirements related to their pressure boundary integrity. They further concluded that the nature of the problem and their application of the instruments excluded this defect as reportable under 10 CFR 21, however, they will be returned to Rosemont for correction of the defect. Further, discussions with G&H engineering personnel revealed that in their ap lication there is no operational interface with safety systems. It ap is that questions raised by this problem have been satisfactorily resolved.

D. Gibbs & Hill Standard Safety Analysis Report (GIBBSSAR)

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1. Objectives

The objective of this area of the inspection was to verify the closeout of audit findings from the G&H audit report dated May 2, 1978. (Report No. 99900524/78-02 paragraph II.B.3.h)

2. Method of Accomplishment

The preceding objective was accomplished by an examination of:

- a. Client/NRC Audit Follow-Up Log issue No. 2 dated June 1979.
- b. Status Reports of Commitments to NRC (issued monthly to VP, QA) for the months of March, April, May, and June 1979.
- c. The reports of audits of mechanical calculations conducted on January 17, 1979; nuclear calculations conducted on January 23, 1979; and structural engineering conducted on January 30, 1979.
- d. The Master Audit Schedule covering the period April 1978 through July 1980 and the Audit Schedule and Record Sheets for each audited organization.
- 3. Findings
 - a. All findings from the G&H audit of May 1978 have been closed out.
 - Previously identified deviations (Enclosure, Report No. 99900524/78-02) have been closed out (Report No. 99900524/79-01).
 - c. It appears that the implementation of the QA Program as described in the G&H topical report is consistent with the status of ongoing activities in the development of GIBBSSAR.
 - d. There were no deviations or unresolved items identified in this area of the inspection.

E. Design Inspection - Containment Spray System

1. Objectives

The objectives of this area of the inspection were to verify the following items, not completed during the previous inspection (Report No. 99900524/78-02) for the containment spray system:

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- a. Design analyses establish the capability of the system to provide flow at rates and temperature which result in heat removal rates consistent with those utilized in the LOCA and/or main steam line break analyses.
- b. Provisions and plans have been made for pre-operational and operational testing consistent with SAR commitments and statements.
- c. The analysis (design) of system spray coverage supports SAR commitments and statements.
- d. The system design for pH control including analyses of pH versus time after system actuation supports SAR commitments and statements.
- Provisions to prevent trapping of chemical additivies implement SAR commitments.
- f. Calculations of iodine removal constants, use parameters, and system characteristics are consistent with those in items a-h of Report No. 78-02, paragraph I.C.1.
- g. Iodine removal constants used in the analyses of the radiological consequences of a LOCA are consistent with item f. above.

2. Method of Accomplishment

The preceding objectives were accomplished by an examination of:

- a. Sections 6.2.3 (Containment Air Purification and Cleanup System), 6.2.2 (Containment Heat Removal System), 6.2.1.3 (Mass and Energy Release Analysis for Postulated Loss-of-Coolant Accidents), Table 6.2-11 (Containment Spray System Component Design Parameters), and Table 6.2.1-2 (Peak Containment Pressures and Temperatures for a Spectrum of Loss-of-Coolant Accidents and Steam Line Breaks) of the Comanche Peak Steam Electric Station (CPSES) FSAR; and Section 17.1.2 (Quality Assurance During Design and Construction (Gibbs & Hill)) of the CPSES PSAR to identify the technical and programmatic commitments for the Containment Spray System (CSS).
- b. Procedure Nos. DC-7 (Technical Calculation Procedure), DC-9 (Design Review Procedure - Specifications), and DC-10 (Design Review Procedure - Calculations) of the CPSES Project Procedures Manual; and QAII-D (Engineering and Design Verification)

Procedure) of the G&H QA Manual to determine that they were consistent with SAR commitments.

c. Calculations No. NC-AA-05 (LOCA malysis), NC-CT-2 (LOCA Analysis) and associated rect is e.g., the Design Review -Calculations - Record Form and the Nuclear Checklist -Calculations to verify that they satisfied E.l.g. and E.l.a. above, and were done in accordance with applicable procedures.

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- d. Drawing No. 2323-MI-0232 (Flow Diagram Containment Spray System) Revision 5 dated June 7, 1978 to verify that it provided for pre-operational and operational testing (E.1.b. above) and was done in accordance with applicable procedures.
- e. Calculation No. 232-10 (Containment Sprayed Volume) dated April 29, 1977 and its associated records, e.g., Design Verification Record Form and Mechanical Checklist - Calculations to verify that it satisfied E.l.c. above and was done in accordance with applicable procedures.
- f. Calculation No. 232-7 (Injection and Sump Solution pH) Revision 1 dated March 21, 1979 and its associated records, e.g., Design Review - Calculations - Record Form and Mechanical Checklist-Calculations to verify that it satisfied E.1.d. above and was done in accordance with applicable procedures.
- 3. Findings

There were no deviations or unresolved items identified in this area of the inspection; however, the following items were identified:

a. Calculation No. NC-CT-2 (LOCA Analysis)

The table of data on page 10 was not revised to reflect the changes made during Revision 1.

- b. Calculation No. 232-10 (Containment Sprayed Volume)
 - (1) On Page 19: The volume of a rotating platform should be 125 ft^3 , not 1023 ft³, and of a polar brane should be $15,585 \text{ ft}^3$, not 11,255 ft³ as listed.
 - (2) On Page 39: The results of a calculation of a volume 30' x 40' x 1' should be 120 ft³, not 130 ft³ as listed.

- (3) On Page 40: The results of a calculation of a volume $70' \times 4' \times 1'$ should be 280 ft³, not 140 ft³ as listed.
- (4) On Page 39: The results of a calculation plume $56' \times 20'' \phi (56' \times \frac{1}{2}(20/12))$ should be 12: ot 88 ft³.
- (5) On Page 40: The results of a calculation is a volume 84' x⁻¹ should be 16.5 ft³, not 20 ft³.
- (6) On Page 78: The formula for the calculation of Area $A_{XVII} = 1/2[r_2(S_2+C_2)+C_2h_2]$ should be $A_{XVII} = 1/2[r_2(S_2-C_2)+C_2h_2]$.
- (7) On Page 78: The formula for the calculation of Area $A_{XVIII} = 1/2 [r_3(S_3+C_3)+C_3h_3]$ should be $A_{XVIII} = 1/2 [r_3(S_3-C_3)+C_3h_3]$.
- c. G&H management was asked to consider the cause of the type errors identified in a. and b. above and provide actions to prevent recurrence.

F. Exit Interview

An exit interview was held with management representatives on July 13, 1979. In addition to chose individuals indicated by an asterisk in paragraph A of each Details Section, those in attendance were:

- J. R. Ainsworth, QA Engineer, Texas Utilities Generation Company
- P. P. DeRienzo, Vice President, QA
- F. W. Gettler, Jr., Vice President, Power Engineering
- N. N. Keddis, Project QA Supervisor
- A. Matiuk, President and Chief Executive Officer
- R. Prieto, Project Engineer
- W. B. Staab, QA Consulting Engineer
- E. J. Zadina, QA Engineer

The inspector summarized the scope and findings of the inspection. He also stated that, as a result of observations and findings of this inspection, it appeared that a decided improvement has been made of QA activities on the Comanche Peak project such that, at present, QA performance is acceptable.

Management comments were generally for clarification only, or acknowledgement of the statements by the inspector.

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DETAILS SECTION II (Prepared by J. R. Costello)

A. Persons Contacted

- E. Horovitz, Supervising Mechanical Engineer
- *C. A. Jacobsen, Quality Assurance Engineer
- G. M. Reiner, Project Engineer
- H. D. Ricevuta, Associate Quality Assurance Engineer
- P. K. Sweeney, Senior Project Engineer
- *Denotes those present at the exit meeting

B. Design Process Management

1. Objectives

The objectives of this area of inspection were to examine the establishment and implementation of quality related procedures for the design process to assure that:

- a. The design process system is defined, implemented, and enforced in accordance with approved procedures, instructions, or other documentation for all groups performing safety related design activities.
- Design inputs are properly prescribed and used for translation into specifications, drawings, instructions, or procedures.
- c. Appropriate quality standards for items important to safety are identified, documented, and their selection reviewed and approved.
- d. Final design can be related to the design input with this traceability documented, including the steps performed from design input to final design.
- e. Design activities are documented in sufficient detail to permit design verification and auditing.
- f. Methods are prescribed for preparing design analyses, drawings, specifications, and other design documents and they are planned, controlled, and correctly performed.

2. Method of Accomplishment

The preceding objectives were accomplished by an examination of:

- a. Section 17.1.2.3 (Design Control) of the Preliminary Safety Analysis Report, Amendment 5, dated April 5, 1974, for Comanche Peak Steam Electric Station.
- b. Section 17.1.3 (Design Control) of the Final Safety Analysis Report, Amendment 6, dated May 31, 1979, for Comanche Peak Steam Electric Station.
- c. Gibbs & Hill Project Guide for Comanche Peak Steam Electric Station, Latest Revision dated June 22, 1979.
- d. Implementing instructions and procedures to satisfy PSAR/FSAR Quality Assurance Program Commitments, Gibbs & Hill Project Guide for Comanche Peak Steam Electric Station and to satisfy the intent of the objectives section above. These are as follows:
 - Project Procedures for the Comanche Peak Steam Electric Station.
 - (a) Project Administration

PA-4, Revision 2, February 1979 Project Guide

(b) Project Control

PC-2, Revision 1, March 1972 PC-3, Revision 2, August 1974 PC-4, Revision 4, April 1978 PC-5, Revision 2, May 1973 PC-6, Revision 1, March 1972 PC-6, Revision

(c) Design Control

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DC-1, Revision 1, March 1972 Co ca DC-2, Revision 3, December 1973 De DC-3, Revision 3, April 1978 Dr

Codes & Standards Application Design Description Drawing Production

DC-4, Revision 4, May 1975 DC-5, Revision 4, April 1978 DC-7, Revision 5, April 1978 DC-8, Revision 4, May 1979 DC-9, Revision 4, May 1979 DC-10, Revision 4, May 1979 DC-13, Revision 2, May 1979 Design Drawing, Checking and Approval Specification Production and Solicitation of Bids Technical Calculations Design Review Procedure-Drawings Design Review Procedure-Specifications Design Review Procedure-Calculations Identification and Control of Design Interfaces both External and Internal

(d) Quality Assurance

QA-7, Revision 2, April 1979

Issuance, Modification and Control of Project Procedures Manual

- e. Documents to verify implementation of PSAR/FSAR Quality Assurance Program commitments, procedural and project guide requirements and to satisfy the intent of the objectives section. These documents are as follows:
 - Drawing Status Report Project No. 11-2323-001, dated 6/15/79.
 - (2) Specification Status Report Project No. 11-2323-001, Issue 32, dated December 1978.
 - (3) Specification Status Report Project No. 11-2323-001, Issue 34, dated May 1979.
 - (4) Specification 2323-MS-15A, dated 12/12/77 Reactor Makeup Water Pumps Nuclear - design review completed 4/18/78 - vendor Bingham Willamette.
 - (5) Specification 2323-MS-20B.3, dated 6/15/78 Rubber Lined Steel Check Valves - design review completed 7/21/78 vendor TRW Mission Manufacturing Company.
 - (6) Specification 2323-MS-100, dated 8/15/77 Piping Erection Specification - design review completed 11/28/77 - design review for revision 5 completed 3/23/79 - construction specification.

- (7) Specification 2323-SS-10, dated 3/2/79 Reinforcing Steel - design review completed 4/11/79 - construction specification.
- (8) Specification 2323-SS-20, dated 7/22/79 Seismic Criteria for Equipment Design - design review completed 8/24/76 - general specification.
- (9) Specification 2323-ES-9, dated 10/28/77 Static Uninterruptible Power Supply Systems - design review completed 4/5/78.
- (10) Specification 2323-ES-16, dated 4/7/78 Digital Radiation Monitoring System - design review completed 6/7/78.
- (11) Specification 2323-AS-27, dated 3/20/78 Watertight Doors - design review completed 4/17/78.
- (12) Calculation No. 16, Set 1 Manual Calculations Equipment Loads (Auxiliary Building) - Book SAB 120G-1.
- (13) Calculation No. 5, Set 1 Reactor Building Containment Penetrations - Book SRB-108C.
- (14) Calculation No. 2-260 Residual Heat Removal System Heat Loss - Book 9.2.
- (15) Technical Description 2323-TD-0228, dated 6/7/76 Primary Plant Sampling System.
- (16) Technical Description 2323-TD-0235, dated 6/10/76 Spent Fuel Pool Cooling and Cleanup System.
- (17) Technical Description 2323-MI-0241, dated 6/14/76 Demineralized & Reactor Make-Up-Water.
- (18) Technical Description 2323-TD-0302, dated 6/22/76 Diesel Generator Room Heating and Ventilating System.
- (19) Drawing E1-0036-32, Revision 1, 3/3/77 Solenoid Operated Damper X-HV-6179, Primary Plant Ventilation Exhaust Damper.
- (20) Drawing E1-0171-03, Revision 1, 3/15/79 Main Control Board CPI-ECPRCB-03, Interconnection Diagram.
- (21) Drawing E1-0031-45, Revision 1. 1/11/77 6.9KV Switchgear Bus 1EA1 Safety Injection Pump #11 Breaker 1APS11 Schematic Diagram.

- (22) Drawing E1-0022, Revision 1, 10/12/76 Reactor-Turbing-Generator Trip Protection Diagram, Unit 1.
- (23) Drawing M1-2702-1, Revision 3, 4/26/79 Instrumentation & Control Diagram - Main Steam Reheat and Steam Dump System.
- (24) Drawing M2-3513-13, Issue A, 12/11/78 Diesel Generator Exhaust, Diesel Generator Room.
- (25) Drawing S-0836, Revision 2, 10/21/77 Fuel Building Crane Supports & Details.
- (26) Drawing S1-0584, Revision 2, 4/3/79 Reactor Building Internal Structure Pipe Whip Restraints.

3. Findings

In this area of inspection, one deviation from commitment was identified. There were no unresolved items.

- a. Deviation (See Enclosure, "Notice of Deviation")
- b. Present Project Control Procedure PC-3, Revision 2, dated August 1974 (Specification Production Procedure) calls for a specification schedule to be prepared monthly by the project group which is to be used in conjunction with the schedule issued by the Procurement Department.

The project group in conjunction with the purchasing group has developed a new series of reports called the Specification Assignment Report and the Specification and Purchase Order Report to replace the present Specification Status Reports. The new reports contain more information and will be issued periodically as needed rather than monthly. Work is in progress to update the Project Procedures to reflect this change.

This area will be further inspected during the next regular inspection.

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DETAILS SECTION III (Prepared by Ross L. Brown)

A. Persons Contacted

M. L. Bergman, Senior Structural Engineer

E. J. Bond, Supervising Structural Engineering

*B. Czarnogorski, Quality Assurance Engineer

H. D. Ricevuto, Quality Assurance Engineer

T. R. Vardaro, Supervising Electrical Engineer

*Denotes those present at exit meeting

B. Design Change Control

1. Objectives

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

- a. Procedures have been established and implemented for controlling changes to approved design documents.
- b. Design changes are:
 - (1) reviewed for the impact of the change
 - (2) documented as to the action taken, and
 - (3) transmitted to all affected persons and organizations.
- c. The design changes are justified and subjected to review and approval by the same groups or organizations as for the original design (see d. below for exceptions).
- d. When responsibility has been changed, the designated organization shall have access to the pertinent information, competence in the specific area of design, and an understanding of the requirements and intent of the original design.

2. Method of Accomplishment

The preceding objectives were accomplished by an examination of:

a. The following instructions and procedures:

- Gibbs & Hill (G&H) Project Guide for Comanche Peak Steam Electric Station (CPSES) (Contract No. 2323), Section V, to identify any additional and/or unique project requirements relative to design change control.
- (2) Project Procedures Manual, procedure numbers:
 - (a) FL-3, Rev. 2; Specification Production
 - (b) PC-4, Rev. 4; Vendor Drawing, Documents and Request for Deviations Handling Procedure that describes the method(s) for handling vendor deviation requests and modification of the applicable specification and/or drawing.
 - (c) PC-8, Rev. 3; Change Order Procedure Engineering and Design, establishes the procedure to be followed and assigns responsibilities in handling engineering and design changes, regardless of the cause.
 - (d) PC-9, Rev. 3; Design Change Procedure Field, describes the procedures followed in handling field changes or deviations and to ensure proper control by qualified personnel of these changes or deviations and to establish the impact on the project and its technical acceptability.
 - (e) DC-2, Rev. 4; DESIGN Description Procedure Requires, a design description document to be prepared stating all pertinent and relevant information required by the design personnel, and any design and/or technical revisions made after the first approved issue the requirement are the same as for the first issue.
 - (f DC-4, Rev. 4; Design Drawing Checking and Approval Procedure, establishes the guidelines to be followed in the Engineering and Design Departments for checking and approving drawings, including changes thereto.
 - (g) DC-7, Rev. 5; Technical Calculation Procedure, requires that all calculations (including changes) performed as part of the engineering and design

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effort are formally recorded, checked, approved and properly stored.

- (h) DC-8, Rev. 3; Design Review Procedure -Drawings, requires that a design review be performed on all drawings and subsequent revisions for safety related structures, systems and components. The design review is performed against a checklist prepared for each discipline establishing those items to be addressed by the reviewer.
- (i) DC-9, Rev. 3; Design Review Procedure -Specifications, requires that a design review be performed on specifications (and revisions) for all safety related structures, systems and components. The design review is to be performed by a qualified Design Review Engineer against a prepared checklist for each discipline.
- (j) DC-10, Rev. 3; Design Review Procedure -Calculations, requires that a design review be performed on calculations (and revisions) by the appropriate department for all safety related structures, systems, and components.
- (k) QA-1, Rev. 4; Design and Engineering Surveillance Procedure, establishes the guidelines for QA surveillance of design and engineering activities to provide confidence that the applicable project requirements are being implemented.
- b. The following documents related to Contract 2323:
 - (1) Specification and Applicable Design Review Checklist:
 - (a) MS-12, issue 2, Containment Spray Pump.
 - (b) MS-20B.1, issue 2, Steel Valves 2 1/2-inch and Larger.
 - (c) ES-8A, issue 2, Batteries and Accessories.
 - (d) ES-12, issue 1, Electrical Penetrations Assemblies.

- (e) SS-15, issue 3, Personnel Air Lock.
- (f) SS-18, issue 2, Stainless Steel Liver.
- (2) Drawings and Applicable Design Review Checklist:
 - (a) M1-0510, Rev. 6, Containment Spray Piping Arrgt. Sections.
 - (b) E1-0018-1, Rev. 3, 208,120, and 118 VAC One Line Diagram.
 - (c) E1-0033-11, Rev. 3, Bus 1EB2 & 1EB4, Bus Tie Bkr. BT-1EB24.
 - (d) S1-0581, Rev. 2, R.B Internal Structural Pipewhip Restraints, SR.1.
 - (e) S1-03116, Rev. 3, Condensate Storage Tank.
- (3) Design/Engineering Change/Deviation Requests (DE/CD); S-00738, S-00903, Rev. 1, S-00673, S-01189, S-00943, S-00690, Rev. 1, S-00327 and S-00827.
- (4) Calculations for SS-15, Personnel Air Lock.
- (5) Specification Status Report.
- (6) Drawing Status Report.
- 3. Findings

No deviations from commitment or unresolved items were identified in this area of the inspection.