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STRAIN GAGE TEST REPORT OF A 30 MEGAWATT PROTOTYPE STEAM GENERATOR FOR SODIUM COOLED REACTOR SYSTEMS

Submitted to
The United States
Atomic Energy Commission
Chicago Operations Office
Under Contract AT(11-1)-1213

RELEASED FOR ANNOUNCEMENT
IN NUCLEAR SCIENCE ABSTRACTS

BALDWIN · LIMA · HAMILTON
Industrial Equipment Division

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Report C00-1213-27

Strain Gage Test Report
On 30 Megawatt Steam Generator Prototype
For Sodium Cooled Reactor Systems

Submitted To

United States Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois

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December 1, 1964

Baldwin-Lima-Hamilton Corporation
Industrial Equipment Division
Philadelphia, Pennsylvania 19142

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STRAIN GAGE REPORT

I. Introduction

- A. Scope of Work. In conjunction with the hydrostatic test of the steam generator at Baldwin-Lima-Hamilton Corporation, certain strain gage data was obtained for pressure stress evaluation. With this strain data the stress calculations for the upper and lower heads could be verified and also results would provide valuable data for shell nozzle reinforcement design. The diameter of the sodium nozzles on the steam generator shell is large compared to the shell diameter and the ratio is beyond the range of the Bijlaard coefficients as given on the original charts. These curves also give the thickness of the shell required in the vicinity of the nozzles but do not indicate the length beyond the nozzle that the thickness must be maintained. Experimental verification of the extrapolation of these curves together with the length of nozzle reinforcement will be obtained.

The test was originally described in Section III of APAE Report 122 entitled "Ambient Temperature Pressure Stress Evaluation of the Steam Generator." The original test as proposed was changed somewhat in that room temperature strain gages were installed instead of the high temperature strain gages. These strain gages were removed from the steam generator before shipment of the unit. The high temperature strain gages will be installed by Atomics International at the SCTI test installation at some future date after the steam generator has been installed.

- B. Contents of Report. This report contains a description of strain gages used, individual strain gage location on the steam generator, methods of attaching strain gages to the vessel, methods of water-proofing strain gages and methods of recording strains. Also contained is a study of results of strain gage test where actual experimental strains were recorded, strains converted to stresses, and these actual stresses compared to theoretical stresses recorded in the design report. Written descriptions, use of photographs, figures and drawings are methods employed to explain and describe this information.

II. General Conclusions

A complete summary of the experimental results and their interpretation are given in Section VI for each individual test run. It is the intention to present here the overall experimental results and the degree to which the validity of the theory was checked.

In regards to the nozzle external loading it can be stated that the test stresses obtained agree closely with the data included in the Bijlaard's curves. The only applied external loads at which the stresses were found to be slightly above those predicted by the theory were those of the longitudinal moments on the nozzle.

It is also clearly proven that the extra thickness of the shell required in the vicinity of the nozzle so as to keep the stresses induced by the nozzle loading within acceptable limits does not have to be maintained to more than two nozzle diameters on each side of the transverse centerline of the nozzle and possibly less. The only significant stresses arising from the nozzle loadings were those at the junction or in its vicinity. The variation of stress when the nozzle loading was applied without internal pressure in the shell to that obtained when an internal pressure was present is very insignificant to even be detected clearly. Apparently, this was due to the low ratio of shell internal radius to its thickness which is equal to approximately $14\frac{1}{4}$.

The most significant accomplishment of the hydrostatic shell test was the determination of the stresses at the junction of the secondary inlet nozzle to the shell. This area of high concentration of stress would represent a difficult, if not impossible, job in evaluating the stresses theoretically. It was found, however, that the variation of stresses in the neighborhood of the nozzle to shell junction exhibited characteristics similar to those anticipated in a plate subjected to tensile stresses and having a hole in the middle of its length. Any other gage locations far from the nozzle have indicated stresses which were predicted by the theory.

The tube side hydrostatic test was very useful in determining the stresses at many locations at which they would be difficult to be evaluated theoretically. A few of the

internal gages indicated erroneous strain readings and, consequently, it is recommended that these locations be further investigated. They are gage locations 36, 38, 41 and 86 which indicate inconclusive and inconsistent results. Likewise, gage locations 30, 40, 75, 79 and 85, which were either grounded or showed erratic readings should also be investigated.

One area where a definite comparison of calculated stresses versus experimental could be made was the manway cover. The recomputed stresses tabulated in this report and based on the plate being fixed indicate a good check of the theory.

III. Strain Gages

- A. Selection of Strain Gages. The room temperature strain gages selected for use in this test were Baldwin SR-4 temperature compensated constantan foil gage rosettes with either a paper or epoxy base as manufactured by the Electronics Division of the Baldwin-Lima-Hamilton Corporation. For measurement of uniaxial strains type FA (epoxy base) or FAP (paper base) 1/16" single element rosettes were used and type FAD (epoxy base) 1/16" two element 90° single plane gage rosettes were used to measure biaxial strains. Where three element gage rosettes were desired, type FAR (epoxy base) three element, 45° single plane or FABR (bakelite base) three element, 45° superimposed were used. In some cases three of the single element gage rosettes were installed at a particular location in order to obtain a three element gage rosette. The three element gages were used in those locations where the direction of principal strain could not be readily determined. All of the gages were supplied with short connecting leads which had been attached to the strain gages by the factory.

These particular room temperature strain gage rosettes were selected in view of the following:

1. Small in size.
2. Are easily installed on curved surface, particularly those at weld junctions of nozzle to shell.
3. Attachment to the vessel is comparatively simple with the use of Eastman 910 cement.
4. Very sensitive to longitudinal strain.
5. Temperature compensate gages.
6. Availability.
7. Low cost.

Drawings of rosettes used with a dimensional description is shown on Figure 1. Figure 2 shows particular gage used, number of gages used to form rosette for each gage location, and gages used for each test.

- B. Strain gages were installed in 73 locations on outside of vessel and 10 locations on inside of upper head and are located per following list. Gages marked with an asterisk (*) are internal gage locations. Drawing No. H-42207-1-22 shows relative position of gages, locates sectional lines and also locates some of the gages dimensionally.

GAGES PLACED ALONG SECTIONS A-A AND B-B, 45° AWAY FROM THE CENTERLINE OF THE STEAM OUTLET CONNECTION AS FOLLOWS:

SECTION A-A	SECTION B-B	LOCATION
SG-1	SG-5	Two inches below upper face of tube sheet.
SG-2	SG-6	Opposite upper face of tube sheet.
SG-3	SG-7	At weld centerline.
SG-4	SG-8	At surface discontinuity approximately ten inches above weld centerline.

GAGES PLACED ALONG SECTION C-C IN IRREGULAR REGIONS OF STEAM OUTLET AND MANWAY AND OTHER REGIONS OF THE HEAD

GAGE NUMBER	LOCATION
SG-9	At weld centerline.
SG-10	Three inches above weld centerline.
SG-11	At upper edge of steam nozzle weld.
SG-12	At edge of manhole reinforcement adjacent to weld.
SG-13	At edge of manhole reinforcement 180° from SG-12.
SG-36*	At inside of head under SG-76.
SG-37*	At inside of head at junction of manway cover and head.
SG-38*	At inside of head at junction of manway cover and head next to steam outlet nozzle.
SG-39*	At inside of head at junction of steam outlet nozzle and head.

SG-40* On tube sheet outside outer tube limit.
SG-41* 180° from SG-39 on inside of head.
SG-45 90° from the vertical centerline of the steam
outlet nozzle lying in the transverse center-
line plane of the same nozzle.
SG-46 At weld joining the steam outlet nozzle to the
& head and lying diametrically opposite in the
SG-47 transverse centerline of the same nozzle. (See
Plan View)
SG-67 At tapered tube sheet periphery approximately
one inch below upper tube sheet surface in
Section C-C.
SG-68 Two inches above weld center on lower lip of
upper tube sheet in Section C-C.
SG-69 At center of weld directly under SG-68.
SG-70 At weld joining the steam outlet nozzle to the
& head and lying diametrically opposite in the
SG-71 vertical centerline of the same nozzle.
SG-72 At surface extending circumferentially a short
distance from SG-47 and lying in the transverse
centerline plane of the steam outlet nozzle.
(See Plan View)
SG-73 Approximately half-way up the nozzle taper
extending from the weld joining the steam
outlet nozzle to the head. (See Plan View)
SG-74 At end of steam outlet nozzle taper in line
with SG-47 and SG-73. (See Plan View)
SG-75 At center of tube sheet to shell weld 180° from
SG-69.
SG-76 At weld centerline 180° from SG-9.
SG-77 At tube sheet periphery 180° from SG-67.
SG-78 At lower lip of upper tube sheet 180° from
SG-68.
SG-83* Equidistant from SG-36 and SG-37 at inside of
head.
SG-84* 180° from SG-86.
SG-85* At inside of head under SG-9.
SG-86* At inside of head 1" from face of tube sheet.

GAGES ON THE UPPER FACE OF THE MANWAY COVER

GAGE NUMBER	LOCATION
SG-14	Center of cover.

SG-15 Five and one-half inches from center of cover.
SG-16 Five and one-half inches from center of cover,
and 180° from SG-15.

GAGES LOCATED ON TWO UPPER MANWAY STUDS

GAGE NUMBER	LOCATION
SG-17	Outside portion of stud in middle of manway cover on Section B-B.
SG-18	180° from SG-17.
SG-19	Same as SG-17 except bolt toward steam outlet nozzle.
SG-20	180° from SG-19.

GAGES ON VERTICAL (LONGITUDINAL) CENTERLINE OF SODIUM

INLET NOZZLE

GAGE NUMBER	LOCATION
SG-22	Center of nozzle weld towards bottom of vessel.
SG-24	Center of nozzle weld towards top of vessel.
SG-25	Six inches above SG-26.
SG-26	Six inches above SG-27.
SG-27	Three inches above SG-63.
SG-28	Three inches above SG-61.
SG-29	Three inches below SG-60.
SG-30	Three inches below SG-62.
SG-31	Six inches below SG-30.
SG-32	Six inches below SG-31.
SG-51	One inch up nozzle from SG-22.
SG-53	One inch up nozzle from SG-24.
SG-56	One inch down shell from SG-22.
SG-58	One inch up shell from SG-24.
SG-60	Twelve inches down shell from horizontal centerline of nozzle.
SG-61	Twelve inches up shell from horizontal centerline of nozzle.
SG-62	Three inches below SG-29.
SG-63	Three inches above SG-28.

GAGES ON HORIZONTAL CENTERLINE OF SODIUM INLET NOZZLE

GAGE NUMBER	LOCATION
SG-21	Center of nozzle weld 90° clockwise from SG-24.
SG-23	Center of nozzle weld 90° clockwise from SG-22.
SG-33	On shell three inches from SG-57.
SG-34	On shell three inches from SG-59.
SG-48	Center of nozzle weld diametrically opposite from SG-49.
SG-49	Center of nozzle weld 45° clockwise from SG-21.
SG-50	One inch up nozzle from SG-49 in line with SG-48 and SG-49.
SG-52	One inch up nozzle from SG-23.
SG-54	One inch up nozzle from SG-21.
SG-55	One inch out on shell from SG-49 in same radial path.
SG-57	On shell one inch from SG-23.
SG-59	On shell one inch from SG-21.
SG-64	One inch up nozzle on radial line to SG-65.
SG-65	Center of nozzle weld and midway between SG-49 and SG-22.
SG-66	One inch out on shell from SG-65 in same radial path.

GAGES LOCATED AROUND RUPTURE DISC NOZZLE

GAGE NUMBER	LOCATION
SG-81	Horizontal centerline of rupture disc nozzle toward bottom of vessel at center of nozzle weld.
SG-82	180° from SG-81.

GAGES LOCATED AT CENTER OF SHELL

GAGE NUMBER	LOCATION
SG-44	At center of shell located 180° from sodium inlet nozzle.
SG-79	At center of shell located 120° from SG-44.

SG-80 At center of shell located 120° from SG-44.

GAGES NOT USED

GAGE
NUMBER

SG-35
SG-42
SG-43

- C. Application to Vessel. In order to have good strain gage results, it is imperative that a good bond is achieved between the strain gage and the vessel. Eastman 910 cement was selected as the bonding agent since it did not require a prolonged bond pressure and the curing time for the initial set of the cement was short. Recommended procedures for applying gages which were used are given in the following brief descriptions:
1. Location of gage was marked on the vessel in the form of a cross. This was done by marking the centerline on the vessel and the location along this centerline marked on pieces of tape which were spaced approximately 1" apart, straddling the centerline. See Picture NX-9-42.
 2. Immediate area where gage was to be located was cleaned with an abrasive wheel to remove any oxide.
 3. Area cleaned with acetone to remove any grease.
 4. Apply the proper catalyst to the back of the strain gage.
 5. Apply Eastman 910 cement to the vessel and spread evenly over application area.
 6. Position gage and apply approximately 15 pounds pressure on top of gage for 1 to 3 minutes until cement sets. A piece of teflon tape was used between the gage and the fingers to keep cement which oozed out around the gage from contacting the skin.

- D. Connection to Strain Gage Terminals. In order to provide protection for strain gage leads against accidental pull while connecting instrumentation lead wires to the gage, it was necessary to install strain gage wiring terminals as junction points. In similar manner as used for applying the strain gages, terminals TL-56 type as manufactured by the Electronics Division of the Baldwin-Lima-Hamilton Corporation were bonded to the vessel. See Picture NX-9-42. The leads from the strain gages were .012" wide by .0025" thick nickel plated copper. These leads were soldered to the one end of the terminals as shown in Picture NX-9-42. Installation of these terminals provided strain relief termination points for the lead wires, resist fatigue of the gage, facilitate strain gage wire lead soldering and make resistance to ground checks of mounted strain gages easier and quicker to do.

The gages were checked for resistance to ground with a General Radio Corporation megohmmeter type #1862-B. In most cases the resistance to ground readings were 50,000 to 100,000 range. In some cases where low resistance was obtained, it was necessary to replace some gages because of insufficient bond between the vessel and strain gage. In other cases low readings to ground were the result of humidity and proper resistance was obtained after the gage was dried out. Either a heat lamp or an electric hair dryer was necessary to provide the necessary heat.

- E. Wiring of Strain Gages - External. Lead wire cables were prepared in advance. Each cable consists of six plastic covered No. 18 gage copper wire strands. Each individual strand of the cable had the plastic insulation skinned back approximately 1" and the ends tagged with gage numbers, i.e. 21A, 21B, 21C. Two leads were required for each gage element. The exterior of the cable was cleaned with acetone to remove grease and then checked for resistance to ground to determine that cable was satisfactory.

In order that the cables could be held in position on the shell and also provide some sort of clamping so that a pull would not be placed on the strain gage terminal, short bars 1/2" x 1/2" by 2" to 4" long were cemented

to the vessel using Armstrong A-2 epoxy cement. Glass tape was wrapped around the cable and clamps then assembled at the area where tape had been applied. These clamps were then held on to the short bars with screws. See Picture NX-9-42.

After cables were clamped in position the individual wires were soldered to the terminal. Care was exercised to see that two leads connected to a strain gage element had the same identification as on the leads, i.e. 21A.

- F. Wiring of Strain Gages - Internal. Since the gages on the inside of the upper head would be subjected to pressure and would be in contact with water, mineral insulated metallic sheathed cables were used.

In these special cables eight bare copper wires are installed inside a copper tube and insulated from each other and the tube by highly compressed refractory mineral insulation (magnesium oxide). Neoprene sheaves which were placed over the individual conductors were brought out through a bakelite washer in a special compression fitting which was soldered to the cable to seal the assembly.

These cables were attached to the internal gage and anchored to the vessel in the same manner as used for the external gages. See Picture NX-9-36. The cables were brought out through the test cap on the tube side outlet nozzle and sealed by use of a standard compression fitting. See Picture NX-9-45.

The special cables are identified as Mineral Insulated Cable Part No. 309/7 SM-1" as manufactured by General Cable Corporation.

- G. Water-proofing Gages. After it had been determined that the strain gages had been installed correctly and the proper resistance to ground had been obtained, it was then ready for water-proofing to protect the gages from moisture. Atmospheric moisture, when absorbed into the body of the strain gage, causes gage instability and also reduces greatly its resistance to ground. Separate methods were used for water-proofing the internal and the external gages as follows.

The external gages were coated with wax as shown on Picture NX-9-44.

The internal gages were first coated with wax and then a thin coat of Armstrong A-2 epoxy cement.

The main water-proofing material was then applied to the gage and the end of the copper tubing in a series of three coats, each coat requiring six to eight hours curing time. This material PR-385-M is manufactured by Product Research Company of Gloucester City, New Jersey. After final coat was cured, two coats of quick drying surface sealer, Herecrol Primer RC-9 was applied. This compound was obtained from Heresite and Chemical Company of Manitowoc, Wisconsin. Finally all surfaces were coated with vaseline jelly. See Picture NX-9-43. Unfortunately some of the internal gages shorted out during the test. This same method of water-proofing the internal gages was used previously at Baldwin-Lima-Hamilton Corporation during the hydro-strain gage test of the EGCR vessel with very excellent results.

IV. Scanner Recorders

- A. Connection Terminal Board. All strain gage leads were connected to a terminal board as shown in Picture NX-9-46. This board served as an intermediate connection board where each gage could be final checked out for resistance to ground to determine its suitability. Leads were subsequently run from this terminal board to the recording instrument.
- B. Recording Instrument. Two Baldwin SR-4 multi-channel scanner strip chart recorders were used for reading and recording the strains. Each scanner recorder is completely self-contained and consists of a strip chart recorder, a controller, and ten switching and balancing modules with each module having ten channels. This gives a total recording capacity for 200 gage elements which was sufficient for this test.
- C. Dummy Gages. Temperature compensated strain gages were used for this test and dummy gages for each type of gage were also used. Gages were mounted on a piece of non-restrained metal and then connected across similar gages at the recorder. The effect of resistance changes in lead wires resulting from temperature variations was eliminated in this manner.
- D. Connection of Strain Gages to Recorder. Strain gages were connected to the recorder in locations shown on Figure 3. Each module of ten channels contained ten gages of same gage factor and gage resistance whenever possible. Dummy compensating gages were also connected to modules employing gages similar to the dummy gage.

V. Test Sequence

- A. Test Description. Since part of the gages would show tension and part show compression, it was necessary to use the half-bridge wheatstone arrangement on the recorder. The individual gages would be balanced at approximately the center of each scale on the recorder for the 0 reading. Then a strain tension would read from 50 to 100 on the chart and compression from 50 to 0 on the chart. The recording instrument had three full scale ranges of 0 to 1000, 0 to 2000 and 0 to 5000 and read in microinches per inch. Typical recording chart is shown in Figure 7.
- B. Individual Tests. Three different test classifications were conducted. During each test, all 83 strain gage locations were recorded, but only those listed for each test had strain data reduced to stresses.

The strain gages were located with one element on the longitudinal axis of the vessel, on the radial center-line of the sodium inlet nozzle or on Section C-C as shown on drawing H42207-1-22, whichever was applicable for each gage. The second element was located in a 90° plane to the first element. When the third element was used, it was located on a 45° or a 135° plane with respect to the first element. Figure 4 gives strain gage orientation.

1. Calibration of Jack. A hydraulic jack with an attached pressure gage was calibrated for applied load vs. pressure gage reading. A Rehl testing machine was used to supply the dead weight load. Results of this test are shown on Figure 5.
2. Shell Side Hydrostatic Test. The specific gage locations which had strains reduced to stresses are as follows:

9, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 40, 44, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 75, 76, 77, 78, 79, 80, 81, 82, 84, 85 and 86.

Results are given in Tests 1 and 14.

3. Shell Inlet Nozzle Test - Thrust A. Thrust A consisted of applying a maximum pressure to center of shell inlet nozzle of 13,300 pounds. See Figure 6. Specific gage locations which had strains reduced to stresses as follows:

21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33,
34, 44, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58,
59, 60, 61, 62, 63, 64, 65, 66, 80, 81.

Results are given in Tests, 2, 3, 4 and 5.

4. Shell Inlet Nozzle Test - Thrust B. Thrust B was applied along longitudinal centerline of shell 42" away from shell inlet nozzle in order to obtain a 480,000 inch pound longitudinal moment. See Figure 6. Specific gage locations which had strains reduced to stresses are the same as in #3 above and as follows:

21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33,
34, 44, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58,
59, 60, 61, 62, 63, 64, 65, 66, 80, 81.

Results are given in Tests 6, 7 and 8.

NOTE: On Page 10 of original test program APAE 122 two separate nozzle moments were to be applied. The first was to be applied along the longitudinal axis of the shell and the second in a plane 45° from the first.

The ALCO design report figured stresses around the nozzle for moments applied in the longitudinal and circumferential direction only and not on the 45° plane as specified in the test program. When a specified moment is imposed on a 45° plane, the stresses at the nozzle are neither the minimum nor the maximum that can be obtained when this same moment is applied either in the longitudinal or circumferential plane. BLH decided that more interpretable test results would be obtained by imposing

moments on the longitudinal and circumferential directions for the following reasons:

1. Data collected could be compared directly with stresses given in the ALCO design report.
2. Strain gages were placed on a 45° and $22\frac{1}{2}^\circ$ plane with respect to the longitudinal plane of the vessel. With these gages, stresses could be obtained as originally proposed on the 45° plane when the maximum moments were applied to the nozzle.
3. Direct stress data could be collected from circumferential moment loading of the nozzle.

For the test BLH designated the first or longitudinal moment as Thrust B and the second or circumferential moment as Thrust C. See Figure 6.

5. Shell Inlet Nozzle Test - Thrust C. Thrust C was applied in a plane 90° from that used for Thrust B, 42" from center of shell inlet nozzle in order to apply a 480,000 inch pound circumferential moment. See Figure 6. Specific gage locations which had strains converted to stresses are the same as those used in Paragraphs 3 and 4 above and are as follows:

21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 44, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 80, 81.

Results are given in Tests 9, 10, 11 and 12.

See note at end of Paragraph 4 on Page 15.

6. Tube Side Hydrostatic Test. The specific gage locations which had strains reduced to stresses are as follows:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 36, 37, 38, 39, 40, 41, 45, 46, 47, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 83, 84, 85 and 86.

Results are given in Test 13.

VI. Test Description and Discussion

A. Test Run No. 1

1. Test Description. (See Paragraph V.B.2 on Page 14)
This test is a shell side hydrostatic test. The test pressures were 0 psi, 150 psi, 300 psi, 620 psi, 300 psi, 150 psi, and 0 psi with tube side at atmospheric pressure. The strain gages were "set" by cycling shell pressure from 0 psi to maximum of 620 psi and back to 0 several times prior to taking test readings until the 0 shift of the strain gages was 15 micro-inches or less.

Test was then conducted as follows:

- a. Strain readings recorded at 0 pressure on shell and tube side.
 - b. Shell pressure increased to 150 psi and strain readings recorded.
 - c. Shell pressure increased to 300 psi and strain readings recorded.
 - d. Shell pressure increased to 620 psi and strain readings recorded.
 - e. Shell pressure decreased to 300 psi and strain readings recorded.
 - f. Shell pressure decreased to 150 psi and strain readings recorded.
 - g. Shell pressure decreased to 0 psi and strain readings recorded.
 - h. Strain readings at increasing and decreasing pressure were compared to establish that the run was satisfactory.
2. Discussion. The most significant information obtained from this run was the concentration factors at the nozzle to shell junction.

No theoretical stresses were computed for this junction since they would involve unknown concentration factors. As expected, the stresses developed at the junction are the highest while their magnitude drops rapidly for short distances from the nozzle and very slowly as the distance increased. The rapid drop is very clearly in evidence by the results of gages 21 and 59, 22 and 56, 23 and 57, and 24 and 58. The slow drop can be ascertained from gages 27, 26 and 25. Between these points of rapid and slow drop there are points where the stress reaches its lowest value and it starts increasing slowly as the distance increases or decreases. This can very easily be detected by looking at gages 58, 61, 28 and 63, 56, 60 29 and 62. This pattern is followed along the longitudinal and circumferential directions of the shell but it is more in evidence along the longitudinal axis where more gages were present.

Three strain gages, numbers 44, 79 and 80, located circumferentially on the shell at the approximate midpoint of the shell confirmed the computed stresses when some allowance is made for the actual shell thickness and imperfect shell curvatures. One element of the three element gage number 79 gave erratic readings.

Gages 68 and 78 located at the junction of the tube sheet and the shell but 180° apart indicate compressive stresses but of appreciably different magnitude. Since this is a point of discontinuity and since the membrane stresses are tensile, it is evident that compressive stresses are developed due to bending. This is what would be expected by inspection since the pressure on the head barrel side is zero and the tube sheet would bow with the diverging surface on the shell side. However, since the stresses indicated are of a different magnitude, it is concluded that the applied discontinuity moments are not equal along the circumference of the shell. This is further evidenced by the fact that while gage 69 indicates a tensile stress, gage 75 indicates a negative one. This can be possible only if the moment at location 75 is larger than that at 69 since the membrane stresses are equal for both locations, if we assume uniform shell thickness.

Another possibility could be that the membrane stresses are different in the two locations due to unequal shell thicknesses. Gages 9 and 76, which are located on the head barrel, sustain the previous conclusion that the moment varies along the circumference since the stresses on this side are attributed to bending only.

Gages 81 and 82 indicate stresses that compare well with those indicated by other gages located at the junction of the inlet nozzle. The stresses that were developed during the pressure shell side run were all within the yield strength of the material of 30,000 psi minimum. A few gages, however, either reached or indicated magnitudes very close to the yield when the shell was under the maximum test pressure of 620 psi. These were gage 65 indicating a stress of 30,051 psi and gage 57 indicating a stress of 29,749 psi. Both are located either near the junction of the nozzle to the shell or close to it.

To sum up, the stresses obtained show good agreement with the ones expected to develop around an opening in the vessel except for a few erratic readings. In general, the strains obtained can be considered within the limitations of the test.

B. Test Runs 2 and 3.

1. Test Description. (See Paragraph V.B.3 on Page 15 and Figure 6) These tests represent nozzle radial external loads when applied as Thrust A at center of nozzle. Two separate tests were conducted and results are given for each. The thrusts are 0 pounds, 3,000 pounds, 6400 pounds, 9900 pounds, 13300 pounds, 9900 pounds, 6400 pounds, 3000 pounds, 0 pounds applied at center of nozzle with shell side and tube side pressure at atmospheric.

In order to "set" the gages thrust load was cycled from 0 to maximum of 13300 pounds and back to 0 several times until the 0 shift of the strain gage readings was 15 microinches or less.

Test was then conducted as follows:

- a. Strain readings recorded with shell and tube side at atmospheric pressure and 0 pounds Thrust A load.
 - b. Thrust A increased to 3,000 pounds and strain readings recorded.
 - c. Thrust A increased to 6,400 pounds and strain readings recorded.
 - d. Thrust A increased to 9,900 pounds and strain readings recorded.
 - e. Thrust A increased to 13,300 pounds and strain readings recorded.
 - f. Thrust A decreased to 9,900 pounds and strain readings recorded.
 - g. Thrust A decreased to 6,400 pounds and strain readings recorded.
 - h. Thrust A decreased to 3,000 pounds and strain readings recorded.
 - i. Thrust A decreased to 0 pounds and strain readings recorded.
 - j. Strain readings at increasing and decreasing thrust load were compared to establish that the test run was satisfactory.
2. Discussion. The object in loading the nozzle externally was to compare the test stresses with those evaluated utilizing the Bijlaard's data as given in his graphs. A quick comparison can be made by referring to the tabulation of test stresses vs. theoretical ones which were computed for the various nozzle load conditions and included in this report as Appendix A. The tabulation indicates a good agreement between test and computed stresses which represent stresses developed at the points of attachment of the nozzle to the shell, that is, the radial

distance from the center of the nozzle where the stress is highest in magnitude. A few gages indicate stresses that are slightly above the calculated ones for the particular load. This is more evident for the case of decreasing loads and can be attributed to the residual stresses remaining after part of the load is removed.

Both test runs indicate clearly that the stress is high in the neighborhood of the junction of the nozzle in the shell and that it decreases rapidly with increasing distance away from the nozzle. It is obvious that the reinforcement around the nozzle does not have to be extended more than two nozzle diameters but possibly less when radial loads are applied to the nozzle. The stresses obtained at the gages 44 and 80 indicate very clearly that the nozzle loading effect is insignificant at points on the vessel located far from the nozzle.

We would expect that gages diametrically opposite would give approximately the same results. Comparison between gages 22 and 49 with gages 180° on opposite sides of the nozzle 24 and 48 shows the first two stresses somewhat higher than the last two. Probable explanation for this would be either that the point of load application for Thrust A was slightly nearer the higher reading gages or that slight differences in metal thickness was encountered in the nozzle wall. In any event results are within expected limitations.

C. Test Runs 4 and 4A.

1. Test Description. (See Paragraph V.B.3 on Page 15 and Figure 6) In this test the same external Thrust A load of 13,300 pounds was applied at center of shell inlet nozzle as in Test Runs 2 and 3 but with the addition of shell side hydrostatic load of 150 psi. The tube side of the unit was at atmospheric pressure.

Test sequence was per following:

- a. Strain readings recorded with tube side at

atmospheric pressure, hydrostatic pressure on shell side of 150 psi, and 0 Thrust A.

- b. Thrust A increased to 3,000 pounds and strain readings recorded.
 - c. Thrust A increased to 6,400 pounds and strain readings recorded.
 - d. Thrust A increased to 9,900 pounds and strain readings recorded.
 - e. Thrust A increased to 13,300 pounds and strain readings recorded.
 - f. Thrust A decreased to 9,900 pounds and strain readings recorded.
 - g. Thrust A decreased to 6,400 pounds and strain readings recorded.
 - h. Thrust A decreased to 3,000 pounds and strain readings recorded.
 - i. Thrust A decreased to 0 pounds and strain readings recorded.
 - j. Strain readings were compared for both increasing and decreasing thrust to determine if test was satisfactory.
2. Discussion - Test Run 4. The object in loading the nozzle externally was to compare the test stresses with those evaluated utilizing the Bijlaard's data as given in his graphs. A quick comparison can be made by referring to the tabulation of test stresses vs. theoretical ones which were computed for the various nozzle load conditions and included in this report at Appendix A. The tabulation indicates a good agreement between test and computed stresses which represent stresses developed at the points of attachment of the nozzle to the shell, that is, the radial distance from the center of the nozzle where the stress is highest in magnitude. A few gages indicate stresses that are slightly above the

calculated ones for the particular load. This is more evident for the case of decreasing loads and can be attributed to the residual stresses remaining after part of the load is removed.

Both test runs indicate clearly that the stress is high in the neighborhood of the junction of the nozzle in the shell and that it decreases rapidly with increasing distance away from the nozzle. It is obvious that the reinforcement around the nozzle does not have to be extended more than two nozzle diameters but possibly less when radial loads are applied to the nozzle. The stresses obtained at the gages 44 and 80 indicate very clearly that the nozzle loading effect is insignificant at points on the vessel located far from the nozzle.

We would expect that gages diametrically opposite would give approximately the same results. Comparison between gages 22 and 49 with gages 180° on opposite sides of the nozzle 24 and 48 shows the first two stresses somewhat higher than the last two. Probable explanation for this would be either that the point of load application for Thrust A was slightly nearer the higher reading gages or that slight differences in metal thickness was encountered in the nozzle wall. In any event results are within expected limitations.

3. Discussion - Test Run 4A. To obtain the combined pressure and nozzle loading stresses induced on the shell side of the steam generator, add the stresses from Test Runs 1 and 4 algebraically for the single and two element gage rosettes.

For three element gage rosettes it is necessary to calculate the combined stresses. Test Run 4A gives calculated results of combined nozzle Thrust A from Test Run 4 and 150 psi shell pressure loading from Test Run 1 for the three element gage rosettes only.

The combined stresses for the various nozzle loads and the 150 psi internal shell pressure are all below the yield stress of the vessel material.

D. Test Run 5 and 5A.

1. Test Description. (See Paragraph V.B.3 on Page 15 and Figure 6) In this test the nozzle was loaded by applying Thrust A externally at center of nozzle as in Tests 2, 3 and 4 but with an internal shell pressure of 300 psi.

Test sequence was conducted per following:

- a. Strain readings recorded with tube side at atmospheric pressure, hydrostatic pressure on shell side of 300 psi, and 0 Thrust A.
 - b. Thrust A increased to 3,000 pounds and strain readings recorded.
 - c. Thrust A increased to 6,400 pounds and strain readings recorded.
 - d. Thrust A increased to 9,900 pounds and strain readings recorded.
 - e. Thrust A increased to 13,300 pounds and strain readings recorded.
 - f. Thrust A decreased to 9,900 pounds and strain readings recorded.
 - g. Thrust A decreased to 6,400 pounds and strain readings recorded.
 - h. Thrust A decreased to 3,000 pounds and strain readings recorded.
 - i. Thrust A decreased to 0 pounds and strain readings recorded.
 - j. Strain readings were compared for both increasing and decreasing thrust to determine if test was satisfactory.
2. Discussion - Test Run 5. This represents the influence of nozzle radial loading upon the vessel when an internal pressure of 300 psi is applied to the

shell. The strains considered, however, were those due to nozzle loading only.

There was good agreement between the test and calculated stresses. All other observations are similar to those of Test Runs 2, 3 and 4.

3. Discussion - Test Run 5A. To obtain the combined pressure and nozzle loading stresses induced on the shell side of the steam generator, add the stresses from Test Runs 1 and 5 algebraically for the single and two element gage rosettes.

For three element gage rosettes it is necessary to calculate the combined stresses. Test Run 5A gives calculated results of combined nozzle Thrust A from Test Run 5 and 300 psi shell pressure loading from Test Run 1 for the three element gage rosettes only.

The combined stresses for the various nozzle loads and the 150 psi internal shell pressure are all below the yield stress of the vessel material.

E. Test Run 6.

1. Test Description. (See Paragraph V.B.4 on Page 15 and Figure 6) In this test a longitudinal moment of 480,000 inch pounds maximum was imposed on the shell inlet nozzle as Thrust B. Point of application of force was 42" from nozzle centerline as shown on Figure 6. The shell and tube side of the steam generator were at atmospheric pressure for this test.

The test sequence was per following:

- a. Strain readings recorded with both shell and tube side at atmospheric pressure and 0 Thrust B.
- b. Thrust B increased to 120,000 inch pounds and strain readings recorded.
- c. Thrust B increased to 240,000 inch pounds and strain readings recorded.

- d. Thrust B increased to 360,000 inch pounds and strain readings recorded.
 - e. Thrust B increased to 480,000 inch pounds and strain readings recorded.
 - f. Thrust B decreased to 360,000 inch pounds and strain readings recorded.
 - g. Thrust B decreased to 240,000 inch pounds and strain readings recorded.
 - h. Thrust B decreased to 120,000 inch pounds and strain readings recorded.
 - i. Thrust B decreased to 0 inch pounds and strain readings recorded.
 - j. Strain readings for increasing and decreasing moment loadings were compared to determine if test was satisfactory.
2. Discussion - Test Run 6. The subject test run represents the influence of external longitudinal moments applied on the steam generator secondary inlet with zero shell side pressure.

The theoretical stresses based on the Bijlaard's data were evaluated and included in Appendix A for all nozzle loadings. These represent the stresses due to moments as well as the force necessary to produce these moments. The stresses under the influence of the full load moment are also evaluated in the design report.

As expected, the higher stresses are developed at the junction of the nozzle to the shell across the minor axis of the nozzle in the longitudinal direction since the external moment is applied in that direction. Specifically, the moment was directed clockwise toward the location of gage 22. The force producing the moment was directed towards the vessel. Any locations, when measured in longitudinal direction, which are equal to or less than the radius of the nozzle such as locations of gages 49, 65 and 48

indicate lower stresses than those of gages 22 and 24. The stresses at points away from the junction drop slowly in the neighborhood of the junction and much faster as the distance increases. The moment does not affect the points located along the major axis and at the junction of the nozzle and shell. The stresses at this plane are those due to the force which produces the moment.

The influence of the nozzle loading on points on the shell located a distance equal to a diameter of the nozzle away from its centerline is very insignificant.

It is obvious then that the reinforcement around the nozzle does not have to be extended more than two diameters from the nozzle axis in all directions and possibly less.

Points such as those of gages 44 and 80 located far from the nozzle show that the nozzle loading has a little effect upon the induced stresses at those points. In comparing the test with the evaluated stresses it can be recognized that the calculated stresses are close, but below the test stresses only for those points such as gage locations 22, 24 and 65 which are at the junction and located on a longitudinal length equal to or slightly less than the longitudinal semi-axis of the nozzle.

It can be concluded that the theoretical stresses are in good agreement with those obtained by the test.

F. Test Runs 7 and 7A.

1. Test Description. (See Paragraph V.B.4 on Page 15 and Figure 6) In this test the same maximum longitudinal moment of 480,000 inch pounds was imposed on the shell inlet nozzle as in Test Run 6 but shell side of unit was hydrostatically loaded to 150 psi. The tube side of unit was at atmospheric pressure.

The test sequence was per following:

- a. Strain readings were recorded with tube side at atmospheric pressure, hydrostatic pressure of 150 psi on shell side and 0 Thrust B.
 - b. Thrust B increased to 120,000 inch pounds and strain readings recorded.
 - c. Thrust B increased to 240,000 inch pounds and strain readings recorded.
 - d. Thrust B increased to 360,000 inch pounds and strain readings recorded.
 - e. Thrust B increased to 480,000 inch pounds and strain readings recorded.
 - f. Thrust B decreased to 360,000 inch pounds and strain readings recorded.
 - g. Thrust B decreased to 240,000 inch pounds and strain readings recorded.
 - h. Thrust B decreased to 120,000 inch pounds and strain readings recorded.
 - i. Thrust B decreased to 0 inch pounds and strain readings recorded.
2. Discussion - Test Run 7. This represents the influence of external longitudinal moments Thrust B on the shell of the vessel when an internal pressure of 150 psi is applied to the shell. The strains considered, however, were those due to the nozzle loading only.
- The same comments as given for Test Run 6 also apply here. The internal pressure has very little effect on the stresses due to the nozzle loading.
3. Discussion - Test Run 7A. To obtain the combined pressure and nozzle loading stress induced on the shell side of the steam generator, add the stresses from Test Runs 1 and 7 algebraically for the single and two element gage rosettes.

For three element gage rosettes it is necessary to calculate the combined stresses. Test Run 7A gives calculated results of combined nozzle Thrust B from Test Run 7 and 150 psi shell pressure loading from Test Run 1 for the three element gage rosettes only.

The combined stresses for the various nozzle loads and the 150 psi internal shell pressure are all below the yield stress of the vessel material.

G. Test Runs 8 and 8A.

1. Test Description. (See Paragraph V.B.4 on Page 15 and Figure 6) In this test the same maximum longitudinal moment of 480,000 inch pounds was imposed on the shell inlet nozzle as in Test Run 6 but shell side of unit was hydrostatically loaded to 300 psi. The tube side of unit was at atmospheric pressure.

The test sequence was as follows:

- a. Strain readings were recorded with tube side at atmospheric pressure, hydrostatic pressure of 300 psi on shell side and 0 Thrust B.
- b. Thrust B increased to 120,000 inch pounds and strain readings recorded.
- c. Thrust B increased to 240,000 inch pounds and strain readings recorded.
- d. Thrust B increased to 360,000 inch pounds and strain readings recorded.
- e. Thrust B increased to 480,000 inch pounds and strain readings recorded.
- f. Thrust B decreased to 360,000 inch pounds and strain readings recorded.
- g. Thrust B decreased to 240,000 inch pounds and strain readings recorded.
- h. Thrust B decreased to 120,000 inch pounds and strain readings recorded.

- i. Thrust B decreased to 0 inch pounds and strain readings recorded.
2. Discussion - Test Run 8. This represents the influence of external longitudinal moments Thrust B on the shell of the vessel when an internal pressure of 300 psi is applied to the shell. The strains considered, however, were those due to the nozzle loading only.

The same comments as given for Test Run 6 also apply here. The internal pressure has very little effect on the stresses due to the nozzle loading.

3. Discussion - Test Run 8A. To obtain the combined pressure and nozzle loading stress induced on the shell side of the steam generator, add the stresses from Test Runs 1 and 8 algebraically for the single and two element gage rosettes.

For three element gage rosettes it is necessary to calculate the combined stresses. Test Run 8A gives calculated results of combined nozzle Thrust B from Test Run 8 and 300 psi shell pressure loading from Test Run 1 for the three element gage rosettes only.

The combined stresses for the various nozzle loads and the 300 psi internal shell pressure are all below the yield stress of the vessel material.

H. Test Run 9.

1. Test Description. (See Paragraph V.B.5 on Page 16 and Figure 6) In this test a circumferential moment of 480,000 inch pounds maximum was imposed on the shell sodium inlet nozzle as Thrust C. Point of application of force was 42" from nozzle centerline as shown on Figure 6. The shell and tube side pressures were at atmospheric pressure for this test.

The test sequence was as follows:

- a. Strain readings recorded with both shell and tube side pressures at atmospheric and 0 Thrust C.

- b. Thrust moment C increased to 120,000 inch pounds and strain readings recorded.
 - c. Thrust moment C increased to 240,000 inch pounds and strain readings recorded.
 - d. Thrust moment C increased to 360,000 inch pounds and strain readings recorded.
 - e. Thrust moment C increased to 480,000 inch pounds and strain readings recorded.
 - f. Thrust moment C decreased to 360,000 inch pounds and strain readings recorded.
 - g. Thrust moment C decreased to 240,000 inch pounds and strain readings recorded.
 - h. Thrust moment C decreased to 120,000 inch pounds and strain readings recorded.
 - i. Thrust moment C decreased to 0 inch pounds and strain readings recorded.
 - j. Strain readings were compared for both increasing and decreasing moment loadings to determine if test was satisfactory.
2. Discussion - Test Run 9. This represents the influence of an external circumferential moment Thrust C applied to the shell nozzle with 0 psi internal hydrostatic pressure in the shell.

The theoretical stresses based on the Bijlaard's data were evaluated and included in Appendix A for all nozzle loadings. These represent the stresses due to moments as well as the force necessary to produce these moments. The design report also gives the evaluated stresses induced by the nozzle full load moment only.

As expected, the higher stresses are developed at the junction of the nozzle to the shell across an axis of the nozzle in the circumferential direction since the external moment is applied in that

direction. Moreover, the moment was directed clockwise toward the location of gage 21. The force producing this moment was directed towards the shell. Any stresses produced at a distance smaller than the major semi-axis of the nozzle such as 65, 49 and 48 are lower than those at locations 21 and 23. At points away from the junction the stresses drop slowly at small distances and faster as the distance increases. Points such as 22 and 24 indicate compressive stresses as expected due to the radial load which produces the moment. At location 21 the stresses due to force and moment are additive. At location 23 the stresses due to the force subtract from those produced by the moment. The influence of the nozzle loading upon points such as 44 and 80 located far from the nozzle is insignificant and the stresses at points equal to one major axis of the nozzle from its center are very small.

In comparing the evaluated with the test stresses it can be seen that the evaluated stresses are somewhat higher than the test ones and, therefore, conservative.

I. Test Run 10 and 10A.

1. Test Description. (See Paragraph V.B.5 on Page 16 and Figure 6) In this test the same circumferential moment of 480,000 inch pounds maximum was imposed on the shell inlet nozzle as Thrust C as in Test Run 9. Point of application of force was 42" from nozzle centerline as shown in Figure 6. The shell side of unit was at 150 psi and the tube side at atmospheric pressure.

Test sequence was as follows:

- a. Strain readings recorded with tube side pressure atmospheric, shell side pressure 150 psi and 0 Thrust C.
- b. Thrust moment C increased to 120,000 inch pounds and strain readings recorded.

- c. Thrust moment C increased to 240,000 inch pounds and strain readings recorded.
 - d. Thrust moment C increased to 360,000 inch pounds and strain readings recorded.
 - e. Thrust moment C increased to 480,000 inch pounds and strain readings recorded.
 - f. Thrust moment C decreased to 360,000 inch pounds and strain readings recorded.
 - g. Thrust moment C decreased to 240,000 inch pounds and strain readings recorded.
 - h. Thrust moment C decreased to 120,000 inch pounds and strain readings recorded.
 - i. Thrust moment C decreased to 0 inch pounds and strain readings recorded.
 - j. Strain readings were compared for both increasing and decreasing moment loadings to determine if test was satisfactory.
2. Discussion - Test Run 10. This represents the influence of an external circumferential moment Thrust C applied to the shell nozzle with 150 psi internal hydrostatic pressure in the shell.
- This test run is similar to Run 9 except that the vessel was subjected to an internal pressure of 150 psi. The same comments as those given for Test Run 9 apply for the subject run. This is evident when one compares the two runs between themselves and their respective stresses with the calculated stresses.
- The stresses induced by the internal pressure are very small so their influence is negligible on those produced by the moment loading.
3. Discussion - Test Run 10A. To obtain the combined pressure and nozzle loading stress induced on the shell side of the steam generator, add the

stresses from Test Runs 1 and 10 algebraically for the single and two element gage rosettes.

For three element gage rosettes it is necessary to calculate the combined stresses. Test Run 10A gives calculated results of combined nozzle Thrust C from Test Run 10 and 150 psi shell pressure loading from Test Run 1 for the three element gage rosettes only.

The combined stresses for the various nozzle loads and the 150 psi internal shell pressure are all below the yield stress of the vessel material.

J. Test Runs 11, 12 and 12A.

1. Test Description. (See Paragraph V.B.5 on Page 16 and Figure 6) In this test the same circumferential moment of 480,000 inch pounds maximum was imposed on the shell inlet nozzle as Thrust C as in Test Runs 9 and 10. Point of application of force was 42" from nozzle centerline as shown on Figure 6. The shell side of the unit was at 300 psi and the tube side at atmospheric pressure. Test Run 12 is a repeat of Run 11 and results are given for each.

Test sequence was as follows:

- a. Strain readings recorded with tube side pressure atmospheric, shell side pressure 300 psi and 0 Thrust C.
- b. Thrust moment C increased to 120,000 inch pounds and strain readings recorded.
- c. Thrust moment C increased to 240,000 inch pounds and strain readings recorded.
- d. Thrust moment C increased to 360,000 inch pounds and strain readings recorded.
- e. Thrust moment C increased to 480,000 inch pounds and strain readings recorded..

- f. Thrust moment C decreased to 360,000 inch pounds and strain readings recorded.
 - g. Thrust moment C decreased to 240,000 inch pounds and strain readings recorded.
 - h. Thrust moment C decreased to 120,000 inch pounds and strain readings recorded.
 - i. Thrust moment C decreased to 0 inch pounds and strain readings recorded.
 - j. Strain readings were compared for both increasing and decreasing moment loadings to determine if test was satisfactory.
2. Discussion - Test Runs 11 and 12. This represents the influence of an external circumferential moment Thrust C applied to the shell nozzle with 300 psi internal hydrostatic pressure in the shell.

Both of these runs are identical and they are different from Run 9 in as far as the shell is under an internal pressure of 300 psi. Both test runs compare closely to each other and to Runs 9 and 10. The influence of the internal pressure upon the stress induced by the nozzle loadings, if any, is small and not too easy to detect.

3. Discussion - Test Run 12A. To obtain the combined pressure and nozzle loading stresses induced on the shell side of the steam generator, add the stresses from Test Runs 1 and 12 algebraically for the single and two element gage rosettes.

For three element gage rosettes it is necessary to calculate the combined stresses. Test Run 12A gives calculated results of combined nozzle Thrust C from Test Run 12 and 300 psi shell pressure loading from Test Run 1 for the three element gage rosettes only.

The combined stresses for the various nozzle loads and the 300 psi internal shell pressure are all below the yield stress of the vessel material.

K. Test Run 13.

1. Test Description. (See Paragraph V.B.6 on Page 16 and Figure 6) This test is a tube side hydrostatic test. Strain gage data was only obtained on the upper head of the steam generator. The test pressures were 0 psi, 1250 psi, 2500 psi, 4400 psi and 6220 psi with shell side of unit at atmospheric pressure. The strain gages were "set" by cycling tube pressure from 0 psi to maximum of 6220 psi and back to 0 several times prior to taking test readings until the 0 shift of the strain gages was 15 microinches or less.

Test was then conducted as follows:

- a. Strain readings recorded at 0 pressure on shell and tube side.
- b. Tube side pressure increased to 1250 psi and strain readings recorded.
- c. Tube side pressure increased to 2500 psi and strain readings recorded.
- d. Tube side pressure increased to 4400 psi and strain readings recorded.
- e. Tube side pressure increased to 6220 psi and strain readings recorded.
- f. Tube side pressure decreased to 4400 psi and strain readings recorded.
- g. Tube side pressure decreased to 2500 psi and strain readings recorded.
- h. Tube side pressure decreased to 1250 psi and strain readings recorded.
- i. Tube side pressure decreased to 0 psi and strain readings recorded.
- j. Strain readings compared for increasing and decreasing pressures to determine if test was satisfactory.

2. Discussion - Test Run 13. The subject test represents the hydrostatic pressure applied to the tube side of the steam generator. The strain gage data obtained on the upper head of the steam generator during tube side hydrostatic test indicates that the pressure stresses obtained are either close to or below the theoretically computed ones. Gages 2 and 6 located on the circular plane at the junction of the tube sheet to the head barrel indicate a very good agreement between the test stresses obtained and the calculated ones. However, the test stresses are lower than the theoretical ones.

Theoretical stresses for gages 3 and 7 which are located approximately 2-3/4" from the tube sheet, were not given in the design report. These stresses were computed with calculations included in this report as Appendix A. Calculated stresses are 5670 psi tensile at 2500 psi pressure. These compare with test stresses of 5452 and 4796 for gages 3 and 7 respectively.

Gages at locations 9 and 76 which are in the same circular plane as gages 3 and 7 but at various angles apart indicate stresses comparable in magnitude between themselves and also with the theoretical ones.

Stresses at locations of gages 4 and 8 were not calculated in the design report. However, when calculated on the basis of spherical shape, neglecting bending, they were slightly below the test stresses. It is realized, however, that bending stresses affect their magnitude.

In the design report the manhole cover was treated as a simply supported plate. The stresses indicated by gage 14 which is located at the center of the manhole cover is considerably below that calculated in the design report for all the test pressures. A new set of calculations was made treating the manhole cover as a fixed plate. We are justified in considering the plate (manhole cover) fixed at the bolt circle since the bolts were pre-loaded to withstand the maximum test pressure. The plate can only move laterally (toward the bolts)

when there is insufficient friction to prevent movement. With low hydrostatic pressures the bolt load provides this "friction load" and the plate can be considered as fixed at the bolt circle. As the internal hydrostatic load approaches the pressure used to determine the bolt preload, the condition of the fixed edges of the plate is changed slightly and the plate is neither in a completely fixed nor a simply supported condition.

The new set of calculations based on a fixed plate indicate very close agreement to test stresses and calculated ones for the 1250, 2500 and 4400 psi test points where the fixed plate theory applies. The test stresses, however, are about 20% higher than the new calculated ones for the full load of 6220 psi for reasons given above. See Appendix A for tabulation of test stresses and new set of calculated stresses.

Gage 36 indicates erratic strain readings in the A-A and B-B directions. Gage 85, which is located in the same circular plane as gage 36 but 180° apart, was grounded during testing. Gage 38 located on the same circular plane as gage 37 but 180° apart indicates compressive stresses of magnitude well above the yield of the material. Obviously, the strain readings were erratic but since gage 38 is located close to the nozzle, it is realized that the connection opening will have a definite influence upon the stresses developed at location 38 and it is suggested that this be further investigated. Gage 41 also indicates stresses well above the yield of the material in contrast to gage 39 which is also located at the fillet existing at the junction of the nozzle to the manhole and 180° apart. It is again realized that gage 41 is located on the side of the tube sheet and this again will have a definite influence upon the stress developed at location of gage 41 and this should also be further investigated.

Gage 45 compares well with gages 9 and 76 located on the same circular plane of the head barrel but at various angles apart. Gages 46 and 47 located on the same circular nozzle plane show also a very good agreement. Gages 67 and 77 located on

the same circular plane on the tube sheet but 180° apart show fairly good agreement with the stress developed at location 67 being higher. This again indicates a definite influence of the nozzle connection upon the stress developed at this location. At locations 68 and 78, the stresses obtained show a good agreement between themselves but are below those calculated.

Inasmuch as gages 69 and 75 are concerned, by inspection it can easily be seen that the strain readings of gage 75 are completely erratic. Gage 69 indicates stresses lower than those indicated by Gage 68 which is located at the junction of the tube sheet and the shell. Since Gage 69 is located away from the junction, the moment is smaller than that at location 68 and, therefore, the stresses are, as expected, lower at location 69. Gage 70 indicates stresses close to the theoretical ones when the connection is considered a cylinder with a radius of 3-1/2" and the thickness is taken as 2" for the plane in which it is located. At location 71 the stresses are higher than those of Gage 70 since Gage 71 is placed exactly at the junction of the nozzle and the head barrel. The stresses indicated at location 72 agree closely to those calculated for the spherical portion of the head where the radius is equal to 14" and the thickness equal to 3-1/8". Gages 73 and 74 indicate stresses which compare well with the hoop stresses of a cylinder with a radius of 3-1/2" and thickness of 1-5/8" and 1-1/8" respectively. The calculated ones are either equal or higher than the obtained ones by a maximum of 12%. See Appendix A.

To sum up, it is evident that the hydrostatic test of the upper head indicated stresses at various points which either compare or are below those calculated or are in the range in which they are expected to be. Again, Gages 38, 41, 83, 84 and 86, all located inside the head barrel, indicate stresses above the yield of the material and despite the assumption that the strain readings were definitely erroneous, it is recommended that they be further investigated.

L. Test Run 14.

1. Test Description. During Test Run 12 (Thrust C on nozzle with 300 psi shell side hydrostatic pressure) strain readings were recorded at 0, 150 and 300 psi shell side pressure with 0 Thrust C. These points were recorded before and after data was taken for Test Run 12.

Additional stress data, as a check against Test Run 1 for 150 psi and 300 psi points on increasing and decreasing shell hydrostatic loads by using available data, was obtained.

2. Discussion. Comparison between this test run and Test Run 1 for test points 150 psi and 300 psi on increasing load and 300 psi and 150 psi on decreasing load show good agreement.

FIGURE I

CONSTANTAN ETCHED FOIL GAGES

Gage Type & Description	Dwg. No.	Base Mat'l of Gage	Gage Factor	Gage Resistance	Nom. Gage Length	Min. Trim Length	Gage Drawing Dimensions							Dia.
A	B	C	D	E	F									
FA-06-12 S9 Single Element	1	Epoxy	2.09±1%	120.0±.5	.06	9/64	.10	.11	-	3/16	3/8	.05	-	
FAP-06-12 S9 Single Element	2	Paper	2.01±1%	120.0±.5	.06	9/64	.10	.11	.05	3/16	3/8	.05	-	
FAD-06-12 S6 2 Element 45° Single Plane to Gage Axis	3	Epoxy	1.94±1.25%	120.0±.5	.06	3/16	.10	.16	-	3/8	7/16	.06	-	
FAR-25-12(45°) S9 3 Element 45° Single Plane	4	Epoxy	2.08±1%	120.0±.5	-	-	-	-	-	-	-	-	-	.25
FABR-12-12 S9 3 Element 45° Superimposed	5	Bakelite	2.125±1%	120.0±.5	.12	-	-	-	.05	3/8	3/8	.09	9/16	

STRAIN GAGE PICTURE

FIGURE I

GAGE NUMBER	NO. GAGES PER ROSETTE	USE — GAGES PER FIGURE #1	DWG. #	STRAIN GAGES USED IN TEST RUN													
				#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14
1	2	1	3													X	
2	2	1	3													X	
3	2	1	3													X	
4	2	1	3													X	
5	2	1	3													X	
6	2	1	3													X	
7	2	1	3													X	
8	2	1	3													X	
9	2	1	3	X												X	X
10	2	1	3													X	
11	2	1	3													X	
12	2	1	3													X	
13	2	1	3													X	
14	2	1	3													X	
15	2	1	3													X	
16	2	1	3													X	
17	1	1	1													X	
18	1	1	1													X	
19	1	1	1													X	
20	1	1	1													X	
21	3	3	1	X	X	X	X	X	X	X	X	X	X	X	X		X
22	3	3	1	X	X	X	X	X	X	X	X	X	X	X	X		X

GAGE NUMBER	NO. GAGES PER ROSETTE	USE — GAGES PER FIGURE #1	DWG. #	STRAIN GAGES USED IN TEST RUN													
				#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14
23	3	3	1	X	X	X	X	X	X	X	X	X	X	X	X		X
24	3	3	1	X	X	X	X	X	X	X	X	X	X	X	X		X
25	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
26	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
27	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
28	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
29	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
30	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
31	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
32	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
33	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
34	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
35	NOT USED																
36	3	1	5	X												X	X
37	3	3	2													X	
38	3	3	2													X	
39	3	3	2													X	
40	3	1	5	X												X	X
41	3	3	2													X	
42	NOT USED																
43	NOT USED																
44	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X

GAGE NUMBER	NO. GAGES PER ROSETTE	USE — GAGES PER FIGURE #1 DWG. #		STRAIN GAGES USED IN TEST RUN													
				#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14
45	3	1	4														
46	3	3	1														
47	3	3	1														
48	3	3	1	X	X	X	X	X	X	X	X	X	X	X	X		X
49	3	3	1	X													X
50	3	1	4	X													X
51	2	1	3	X													X
52	2	1	3	X													X
53	2	1	3	X													X
54	2	1	3	X													X
55	3	1	4	X													X
56	2	1	3	X													X
57	2	1	3	X													X
58	2	1	3	X													X
59	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
60	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
61	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
62	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
63	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
64	3	1	4	X	X	X	X	X	X	X	X	X	X	X	X		X
65	3	3	1	X	X	X	X	X	X	X	X	X	X	X	X		X
66	3	1	4	X	X	X	X	X	X	X	X	X	X	X	X		X

GAGE NUMBER	NO. GAGES PER ROSETTE	USE — GAGES PER FIGURE #1 DWG. #		STRAIN GAGES USED IN TEST RUN													
				#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14
67	2	1	3	X												X	X
68	2	1	3	X												X	X
69	2	1	3	X												X	X
70	2	1	3													X	
71	2	1	3													X	
72	3	1	4													X	
73	3	1	4													X	
74	3	1	4													X	
75	2	1	3	X												X	X
76	2	1	3	X												X	X
77	2	1	3	X												X	X
78	2	1	3	X												X	X
79	2	1	3	X													X
80	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
81	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
82	2	1	3	X	X	X	X	X	X	X	X	X	X	X	X		X
83	3	1	5													X	
84	3	1	5	X												X	X
85	3	1	5	X												X	X
86	3	1	5	X												X	X

FIGURE 3

SCANNER A

MODULE	CHANNEL										REMARKS
	1	2	3	4	5	6	7	8	9	0	
1	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	DWG. #3 FIGURE 1
2	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	
3	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	
4	16A	16B	25A	25B	26A	26B	27A	27B	28A	28B	
5	29A	29B	30A	30B	31A	31B	32A	32B	33A	33B	
6	34A	34B	44A	44B	79A	79B	80A	80B	51A	51B	
7	52A	52B	53A	53B	54A	54B	56A	56B	57A	57B	
8	58A	58B	59A	59B	60A	60B	61A	61B	62A	62B	
9	63A	63B	67A	67B	68A	68B	69A	69B	70A	70B	
10	71A	71B	75A	75B	76A	76B	77A	77B	78A	78B	

SCANNER B

MODULE	CHANNEL										REMARKS
	1	2	3	4	5	6	7	8	9	0	
1	17A	18A	19A	20A	21A	21B	21C	22A	22B	22C	DWG. #1
2	23A	23B	23C	24A	24B	24C	46A	46B	46C		
3	47A	47B	47C	48A	48B	48C	49A	49B	49C		
4	41A	41B	41C	81A	81B		82A	82B			DWG. #2 & 3
5	45A	45B	45C	50A	50B	50C	55A	55B	55C		
6	64A	64B	64C	66A	66B	66C	72A	72B	72C		
7	73A	73B	73C	74A	74B	74C	65A	65B	65C		DWG. #4 (65 DWG #1)
8	36A	36B	36C	40A	40B	40C	83A	83B	83C		
9	84A	84B	84C	85A	85B	85C	86A	86B	86C		
10	37A	37B	37C	38A	38B	38C	39A	39B	39C		DWG. #5 DWG. #2

GAGE CONNECTION TO RECORDERS

FIGURE 3

Gage Number	No. Gages per Rosette	Longitudinal Orientation	Circumferential Orientation	45°	135°
1	2	As	Bs		
2	2	As	Bs		
3	2	As	Bs		
4	2	AH	BH		
5	2	As	Bs		
6	2	As	Bs		
7	2	As	Bs		
8	2	As	Bs		
9	2	AN	BN		
10	2	AN	BN		
11	2	AN	BN		
12	2	AN	BN		
13	2	AN	BN		
14	2	AN	BN		
15	2	AN	BN		
16	2	AN	BN		
17	1	ASTUD			
18	1	ASTUD			
19	1	ASTUD			
20	1	ASTUD			
21	3	AN	BN		CN
22	3	As	Bs	Cs	
23	3	BN	AN		CN
24	3	As	Bs	Cs	
25	2	As	Bs		
26	2	As	Bs		
27	2	As	Bs		
28	2	As	Bs		
29	2	As	Bs		
30	2	As	Bs		

Subscript Legends

S = Shell longitudinal axis or Sec. AA or Sec. BB
N = Shell inlet or tube outlet nozzle or Sec. CC
H = Head

Gage Number	No. Gages per Rosette	Longitudinal Orientation	Circumferential Orientation	45°	135°
31	2	A _S	B _S		
32	2	A _S	B _S		
33	2	B _N	A _N		
34	2	B _N	A _N		
35	NOT	USED			
36	3	A _N	B _N	C _N	
37	3	A _N	B _N	C _N	
38	3	A _N	B _N	C _N	
39	3	A _N	B _N	C _N	
40	3	A _N	B _N	C _N	
41	3	A _N	B _N	C _N	
42	NOT	USED			
43	NOT	USED			
44	2	A _S	B _S		
45	3	A _H	B _H	C _H	
46	3	A _H	B _H	C _H	
47	3	A _H	B _H	C _H	
48	3	A _H	B _H	C _H	
49	3	A _N	B _N		C _N
50	3	A _N		B _N	C _N
51	2	A _S	B _S		
52	2	A _N	B _N		
53	2	A _S	B _S		
54	2	A _N	B _N		
55	2	A _N	B _N		
56	2	A _S	B _S		
57	2	B _N	A _N		
58	2	A _S	B _S		
59	2	B _N	A _N		
60	2	A _S	B _S		

Subscript Legends

S = Shell longitudinal axis or Sec. AA or Sec. BB
 N = Shell inlet or tube outlet nozzle or Sec. CC
 H = Head

Gage Number	No. Gages per Rosette	Longitudinal Orientation	Circumferential Orientation	45°	135°
61	2	As	Bs		
62	2	As	Bs		
63	2	As	Bs		
64	3	AN	CN		BN
65	3	AN	BN	CN	
66	3	AN	BN		CN
67	2	AN	BN		
68	2	AN	BN		
69	2	AN	BN		
70	2	AN	BN		
71	2	AH	BH		
72	3	AH	BH	CH	
73	3	BH	CH		AH
74	3	BH	AH	CH	
75	2	AN	BN		
76	2	AN	BN		
77	2	AN	BN		
78	2	AN	BN		
79	2	As	Bs		
80	2	As	Bs		
81	2	As	Bs		
82	2	As	Bs		
83	3	AN	BN	CN	
84	3	AN	BN	CN	
85	3	AN	BN	CN	
86	3	AN	BN	CN	

Subscript Legends

S = Shell longitudinal axis or Sec. AA or Sec. BB
N = Shell inlet or tube outlet nozzle or Sec. CC
H = Head

THRUST A
13,300*

LOAD	GAGE READING
13300*	1130 PSI
9900*	850 PSI
6400*	560 PSI
3000*	260 PSI

THRUST B&C
480,000 IN.-LBS.
OR
11,428* @ 42"

LOAD	GAGE READING
11,420*	980 PSI
8565*	740 PSI
5710*	500 PSI
2855*	250 PSI

JACK CALIBRATION

FIGURE 5

FIGURE 5 JACK CALIBRATION

Figure 6 - Steam Generator Position and Location of Nozzle Thrusts

Gages inside upper head before water-proofing
showing one lead connected to gage.

Gages around sodium inlet nozzle.

General view of steam outlet nozzle and upper head.

Gages around sodium inlet nozzle and on shell
longitudinal centerline toward lower head.

Gages on upper head.

Gages on upper head.

Gages on shell longitudinal centerline
between sodium inlet nozzle and upper head.

Internal gages shown on photograph NX-9-36
on upper head after water-proofing.

Gages as shown on photograph NX-9-39
after water-proofing with wax.

Gages as shown on Photograph NX-9-40 of upper head after water-proofing with wax.

View showing leads connected to rear of multichannel strain gage recorder and to the switching table. Another set of leads connects strain gages to switching.

Pressurizing shell. Note double pressure gages
on nozzle and recording pressure gage.

APPENDIX A

Description and Tabulation of Evaluated Stresses

Nomenclature

- a_1 - Internal Shell Radius - in.
- E - Modulus of Elasticity - psi
- F - Thrust - lbs.
- h - Average head barrel thickness of tapered section at junction with the tube sheet - in.
- h_1 - Head barrel thickness at 2-3/4" away from the tube side surface of tube sheet - in.
- h_2 - Average shell thickness of tapered section at junction with the tube sheet - in.
- M_x - Applied nozzle moment in the longitudinal direction of the shell - in. lbs.
- M_ϕ - Applied nozzle moment in the circumferential direction of the shell - in. lbs.
- M_E - Discontinuity moment at junction of shell to tube sheet - in. lb./in.
- P - Applied nozzle force in the radial direction of the shell - lbs.
- R - Inside radius of steam outlet nozzle - in.
- ΔR_E - Change in internal radius of shell at the junction with the tube sheet - in.

Greek Letters:

- ν - Poisson's ratio - dimensionless
- σ_x - Stress in the longitudinal direction of shell - psi
- σ_ϕ - Stress in the circumferential direction of shell - psi
- σ_r - Stress in the radial direction of cover - psi
- σ_t - Stress in the tangential direction of cover - psi
- σ_1 - Axial stress - psi
- σ_2 - Hoop stress - psi

Notes:

1. All the number subscripts for h = thickness and σ = stress, Unless utilized as specified above, designate gage locations as indicated on Drawing D-666-4-9.
2. All test stresses indicated in this section are those tabulated in Appendix "D" corresponding to the gage locations indicated by the appropriate number.
3. Where formulas are obtained from Roark, a reference is made to that effect and the symbols defined in his nomenclature are retained.

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SUBJECT:		SECTION SHEET 3 OF 11

DESCRIPTION AND TABULATION OF EVALUATED STRESSES

1. THE STRESSES DUE TO EXTERNAL NOZZLE LOADING ARE CALCULATED UTILIZING BIJLAARD'S GRAPH'S, THE EXPRESSIONS GIVEN BELOW ARE DERIVED IN THE SAME MANNER AS OUTLINED IN THE DESIGN REPORT ^{APAE 112-II} (SEC. 4-C), BUT THEY ARE GIVEN IN TERMS OF MOMENT OR RADIAL FORCE SO AS TO FACILITATE THE EVALUATION OF STRESSES AT VARIOUS APPLIED LOADS

a FOR LONGITUDINAL MOMENT ON THE NOZZLE (THRUST B)

$$\sigma_x = .01245 M_x$$

WHERE M_x = LONG. MOMENT - IN. LBS

$$\sigma_\phi = .01370 M_x$$

b FOR CIRCUMFERENTIAL MOMENT ON THE NOZZLE (THRUST C)

$$\sigma_x = 0.0272 M_\phi$$

WHERE M_ϕ = CIRC. MOMENT - IN. LBS

$$\sigma_\phi = 0.0288 M_\phi$$

c FOR RADIAL LOAD (THRUST A)

$$\sigma_x = 0.1445 P$$

WHERE P = RADIAL FORCE - LBS

$$\sigma_\phi = 0.1825 P$$

IN ALL THE ABOVE CASES σ_x AND σ_ϕ ARE THE LONGITUDINAL AND CIRCUMFERENTIAL STRESSES THE LARGEST WILL BE EVALUATED IN ALL THE CASES.

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SUBJECT:		SECTION SHEET 4 OF 11

RADIAL LOAD ON THE NOZZLE

FOR GAGES 21, 22, 23, 24, 48
49, 65

$$\sigma_x = -0.1445F$$

$$\sigma_y = -0.1825F$$

LONGITUDINAL LOAD ON NOZZLE

CIRCUMFERENTIAL LOAD ON NOZZLE

NOTE: FOR OTHER NOZZLE LOCATIONS
SEE DRAWING NO. D666-4-9

FOR GAGES 22 & 24 $\left\{ \begin{array}{l} \sigma_x = -0.1445F \\ \sigma_y = -0.1825F \end{array} \right.$
(SEE ABOVE)

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SUBJECT:		SECTION SHEET 5 OF 11

TABULATION OF NOZZLE LOADING STRESSES

THE TABULATED STRESSES GIVEN BELOW ARE CALCULATED USING THE EXPRESSIONS OF PAGE 2 OF THIS SECTION. ALTHOUGH BOTH LONGITUDINAL AND CIRCUMFERENTIAL STRESSES ARE CALCULATED FOR EACH CASE, THE HIGHEST OF THE TWO IN ABSOLUTE VALUE SHOULD BE CONSIDERED WHEN COMPARED WITH THE OBTAINED TEST STRESSES

a. RADIAL LOAD (THRUST A)

P lbs	STRESS-P.S.I.	
	σ_x	σ_ϕ
3000	-435	-548
6400	-925	-1170
9900	-1430	-1805
13,300	-1925	-2430

THE STRESSES AT LEFT CAN BE COMPARED WITH THE TEST STRESSES OF GAGE LOCATIONS 21, 22, 23, 24, 48, 49 AND 65 OF TEST RUNS 2, 3, 4 AND 5

b. LONGITUDINAL MOMENT (THRUST B)

F lbs	M_x IN-lbs	STRESS-P.S.I. AT LOCATION					
		22		24		21 AND 23	
		σ_x	σ_ϕ	σ_x	σ_ϕ	σ_x	σ_ϕ
2855	120,000	-1905	-2165	1080	1115	-412	-520
5710	240,000	-3810	-4330	2160	2230	-825	-1040
8565	360,000	-5715	-6495	3240	3345	-1237	-1560
11,420	480,000	-7620	-8660	4320	4460	-1650	-2080

THE ABOVE STRESSES CAN BE COMPARED WITH THOSE OF RUNS 6, 7, 8

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C. CIRCUMFERENTIAL MOMENT (THRUST C)

F lbs	M_{ϕ} in.-lbs	STRESSES-P.S.I. AT LOCATION					
		σ_x 21	σ_{ϕ}	σ_x 23	σ_{ϕ}	σ_x 22 AND 24	σ_{ϕ}
2855	120,000	-3675	-3980	2850	2,940	-412	-520
5710	240,000	-7350	-7960	5700	5,880	-825	-1040
8565	360,000	-11,025	-11,940	8,550	8,820	-1237	-1560
11,420	489,000	-14,700	-15,920	11,400	11,760	-1650	-2080

THE ABOVE STRESSES CAN BE COMPARED WITH THOSE
OF RUNS 9, 10, 11, 12, OF GAGE LOCATIONS AS INDICATED

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SUBJECT:		SECTION SHEET 7 OF 11

CALCULATED STRESSES FOR THE TUBE SIDE FOR THE CYLINDRICAL STEAM OUTLET NOZZLE

LOCATIONS 73 AND 74, $R = 3\frac{1}{2}$, $h_{73} = 1\frac{5}{8}$, $h_{74} = 1\frac{1}{8}$

THE HOOP STRESS IS THEN CALCULATED USING

$$\sigma = \frac{PR}{h} \quad \text{WHERE } P = \text{PRESSURE - P.S.I.}$$

THE CALCULATED STRESSES ARE

P P.S.I.	*CALCULATED STRESSES		TEST STRESSES FROM RUN NO 13		PERCENT OF LOAD
	σ_{73}	P.S.I. σ_{74}	σ_{73}	P.S.I. σ_{74}	
1250	2690	3890	2281 - 2551	3641 - 3889	20
2500	5380	7780	4607 - 4764	7001 - 7094	40
4400	9500	13,700	7781 - 8529	12,156 - 12,809	71
6220	13,400	19,400	11,600 - 12,269	17,309 - 17,783	100

*THE CALCULATED STRESSES DO NOT INCLUDE THE BENDING STRESSES WHICH WERE NOT EVALUATED

FOR THE SPHERICAL HEAD BARREL AND THE PORTION OF CONSTANT THICKNESS, $h = 3\frac{1}{8}$ " AND RADIUS, $R = 14$ " USING $\sigma = \frac{PR}{2h}$ WE OBTAIN THE

TABULATED STRESSES.

P - P.S.I.	σ - P.S.I.	THE STRESSES OF RUN*13 GAGE*13 DO SHOW A GOOD AGREEMENT INDICATING THAT THE BENDING STRESSES ARE NEGLECTABLE. THE STRESSES AT GAGES #11 AND #12 ARE HIGHER. THIS IS EXPECTED SINCE THERE ARE BENDING STRESSES DUE TO THE NOZZLE ARE HIGH
1250	2800	
2500	5600	
4400	9850	
6220	14,800	

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SUBJECT		SECTION SHEET 8 OF 11

STRESSES AT THE POINT OF ATTACHMENT OF THE HEAD BARREL TO THE TUBE SHEET AND SHELL TO TUBE SHEET JUNCTION

FROM THE DESIGN REPORT (APAE-II
PGS H2 TO H12)

$$\Delta R_E = 2376.2 \times 10^{-6} \text{ IN}, M_E = -2574$$

$$h_2 = 1\frac{3}{8}, P = 0 \text{ (SHELL SIDE)}$$

FOR THE SHELL TO TUBE SHEET
JUNCTION, WE HAVE
LONGITUDINAL STRESS,

$$\sigma_1 = \frac{GM}{h^2} = \frac{6 \times 2574}{1375^2} = 8160 \text{ TENSION INSIDE
COMPRESSION OUT}$$

$$\sigma_2 = \pm \gamma \frac{GM}{h^2} + \frac{E \Delta R_E}{\alpha_2} \quad \alpha_2 = 16.56$$

$$\gamma = 0.12 \text{ (FROM REF.)}$$

$$\sigma_2 = \pm 0.3 \times 8160 + \frac{28.3 \times 2376.2 \times 22.5^*}{16.56 \times 283}$$

$$\sigma_2 = \pm 2450 + 3220$$

$$\text{OUTSIDE } \sigma_2 = 5670 \text{ PSI}$$

$$\sigma_2 = 770 \text{ PSI}$$

CALCULATED FOR P=2500 PSI

$$\sigma_1 = 8160 \text{ PSI}$$

$$\sigma_2 = 5670 \text{ PSI}$$

$$\begin{aligned} \sigma_1 &= 17,094 \\ \sigma_2 &= 3269 \\ \sigma_1 &= -5970 \\ \sigma_2 &= -3310 \end{aligned}$$

STRESSES AT
JUNCTION OF HEAD
BARREL TO TUBE
SHEET SEE THE
DESIGN REPORT
APAE II-2-II, H-2 Th...

* THE MOMENT IS ASSUMED TO
BE THE SAME AT ROOM TEMP
AND THE DEFORMATION TO VARY
INVERSELY WITH THE MODULUS
OF ELASTICITY

TEST STRESS

GAGE 68	GAGE 78
$\sigma_1 = 3309$	$\sigma_1 = 3902$
$\sigma_2 = 3078$	$\sigma_2 = 3786$

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FOR A PLANE PARALLEL TO THE TUBE SHEET FACE AND $2\frac{3}{4}$ " AWAY, ON THE TUBE SIDE THE STRESSES ARE EVALUATED BELOW.

IT IS ASSUMED THAT THE MOMENT STAYS THE SAME FOR ROOM TEMPERATURE AS THAT CALCULATED IN THE DESIGN REPORT. IN ACTUALITY THIS IS NOT TRUE

REFERRING TO THE FIGURE OF THE PREVIOUS PAGE WE HAVE $h = 2\frac{1}{2}$ " (AVG. OF TAPERED CYLINDER), $\alpha_2 = 13\frac{3}{4}$, $\alpha_1 = 15.00$ ", $\nu = 0.3$, $M_B = 18,026$, $Q = 9966$ (APAE 112-II)

USING THE EXPRESSION FOR THE MOMENT AT "X" DISTANCE FROM THE DISCONTINUITY MOMENT WE HAVE FROM "ROARK" TABLE XIII CASES 10 AND 11.

$$M_x = M_D e^{-\beta x} [\cos \beta x + \sin \beta x] - \frac{Q_D}{\beta} \sin \beta x$$

WHERE $\beta = \sqrt[4]{\frac{3(1-\nu^2)}{\alpha^2 h^3}}$ USING THE ABOVE CONSTANTS

$\beta = 0.2095$ $\beta x = 0.576$, THE MOMENT THEN IS CALCULATED

AS $M_{2.75} = 700 \text{ IN} \cdot \text{LBS/IN} = \text{MOMENT AT A PLANE } 2\frac{3}{4}" \text{ FROM THE TUBE SIDE SURFACE OF TUBE SHEET}$

THE LONGITUDINAL STRESS THEN BECOMES

$$\sigma_l = \frac{P \alpha_1^2}{2 \alpha_1 h_1} - \frac{6 M}{h_1^2} = \frac{2500 \times 12.75^2}{2 \times 15 \times 2.25} - \frac{6 \times 700}{2.25^2} = 6500 - 830 = 5670 \frac{\text{LB}}{\text{IN}^2}$$

CALCULATED	TEST STRESSES				
	GAGE 3	GAGE 7	GAGE 9	GAGE 76	GAGE 45
$\sigma_l = 5670 \text{ PSI}$	$\sigma_l = 5452$	$\sigma_l = 4796$	$\sigma_l = 4577$	$\sigma_l = 3808$	4296

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SUBJECT:		SECTION SHEET 10 OF 11

MANHOLE COVER STRESSES

THE STRESSES FOR THE MANHOLE COVER WERE CALCULATED IN THE DESIGN REPORT (APAE 112 VOL. 11-PGS. J-2, J-3)

THE ASSUMPTION HERE IS MADE THAT THE PLATE IS FIXED AT THE BOLT CIRCLE

GASKET LOAD = 105,292 lbs

THE GASKET LOAD FOR $P = 6220$

WILL BE $W = \frac{105,292 \times 6220}{2500}$

$W = 262,000 \text{ lbs}$

UTILIZING 7 AND 8 OF TABLE X FROM 'ROARK' WE HAVE DUE TO PRESS.

$$(1) \sigma_r = \sigma_t = \frac{3Pr_0^2}{2\pi t^2} \left[(m+1) \ln \frac{a}{r_0} + (m+1) \frac{r_0^2}{4a^2} \right] \quad a = 11, r_0 = 8.25$$

$$m = 3.85 \quad \nu = .26$$

AND DUE TO GASKET LOAD

$$(2) \sigma_r = \sigma_t = \frac{3W}{4\pi m t^2} \left[(m+1) \left(2 \ln \frac{a}{r_0} + \frac{r_0^2}{a^2} - 1 \right) \right] \quad t = 6^{5/8}$$

BY SUBSTITUTING THE CONSTANTS IN (1) AND (2) WE OBTAIN

$$\sigma_r = \sigma_t = 1.250 P \quad \text{FOR } \nu = 0.260 \quad \sigma_r = 1.282 P \quad \text{FOR } \nu = 0.30$$

$$\sigma_r = \sigma_t = 245 \text{ PSI} \quad \sigma_r = \sigma_t = 238 \text{ PSI}$$

THE FOLLOWING TABLE REPRESENTS THE STRESSES AT GAGE LOCATION 14

P-PSI	STRESS-PSI		STRESS-PSI DESIGN REPORT	STRESSES OF GAGE 14 TEST (MAX)		PERCENT LOAD
	$\nu = 0.26$	$\nu = 0.30$				
1250	1805	1840	5850 SCALED DOWN	1080	2160	20
2500	3370	3440	10,575 (REPORT)	2956	4148	40
4400	5745	5880	17,750 SCALED UP	6174	7389	71
6220	8020	8200	24,600 "	10,070	11,164	100
	FIXED PLATE		SIMPLY SUPPORTED			

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SUBJECT:		SECTION
		SHEET 11 OF 11

USING AGAIN THE EXPRESSION GIVEN BELOW AS TAKEN FROM "ROARK" FOR CASE 7 TABLE X, AND NEGLECTING THE STRESS DUE TO GASKET LOAD WE HAVE FOR GAGE LOCATIONS 15 AND 16

$$\sigma_r = \frac{3 P r_0^2}{2 m t^2} \left[(m+1) \ln \frac{a}{r} + (m+1) \frac{r_0^2}{4 a^2} + (m-1) \frac{r_0^2}{4 r^2} - m \right]$$

$$\sigma_t = \frac{3 P r_0^2}{2 m t^2} \left[(m+1) \ln \frac{a}{r} + (m+1) \frac{r_0^2}{4 a^2} - (m-1) \frac{r_0^2}{4 r^2} - 1 \right]$$

WHERE r = RADIAL DISTANCE OF POINT FROM PLATE ϕ
 $r = 5.5''$ APPROX.

SINCE THE STRESSES DO NOT VARY SIGNIFICANTLY FOR $r = 0.26$ AND $r = 0.3$ THE CALCULATIONS WERE BASED ON $r = 0.3$.

THE FOLLOWING TABLE REPRESENTS THE CALCULATED AND TEST STRESSES FOR GAGE LOCATIONS 15 AND 16

P-PSI	CALCULATED STRESS		TEST STRESSES						PERC LOAD
	σ_r	PSI σ_t	GAGE 15		GAGE 16		σ_r	σ_t	
1250	1390	1135	438	↑ 1474	114	↑ 1404	415	137	20
2500	2780	2270	1620	2639	1180	↑ 2407	1539	984	40
4400	4900	4000	3605	4805	2979	4342	3585	2566	71
6220	6750	5650	↓ 6229	7160	↓ 5441	↓ 6442	↓ 6095	↓ 4590	100

BOTH THE ABOVE TABULATION AND THE ONE ON THE PREVIOUS PAGE, INDICATE THAT THE STRESSES OF DECREASING PRESS. ARE HIGHER THAN THOSE OF INCREASING PRESSURE'S APPARENTLY DUE TO THE RESIDUAL STRESSES WHICH REMAIN AFTER LOADING IS FOLLOWED BY UNLOADING

APPENDIX B

Equations Used to Convert Strain to Stresses

APPENDIX B

STRAIN GAGE ANALYSIS

(Reference: Perry and Lissner "The Strain Gage Primer", 1955)

The true strain is calculated from the relation,

$$\text{True Strain} = (\text{Indicated Strain}) \times (\text{Calibration Gage Factor}) / (\text{True Gage Factor})$$

The stress is determined for a single element rosette by,

$$\text{Stress} = E \times \text{Strain}$$

The stresses are determined for a dual element rosette by,

$$\text{Stress A} = K (\text{Strain A} + \mu \text{ Strain B})$$

$$\text{Stress B} = K (\text{Strain B} + \mu \text{ Strain A})$$

The pertinent functions are determined for a three element rectangular rosette by,

$$\text{Maximum Shearing Stress} = \frac{E}{2(1+\mu)} \sqrt{(\text{Strain A} - \text{Strain B})^2 + (2 \text{ Strain C} - \text{Strain A} - \text{Strain B})^2}$$

$$\text{Maximum Principal Stress} = \frac{E}{2(1-\mu)} (\text{Strain A} + \text{Strain B}) + \text{Maximum Shearing Stress}$$

$$\text{Minimum Principal Stress} = \text{Maximum Principal Stress} - 2 \text{ Maximum Shearing Stress}$$

$$\text{Angle of Principal Direction} = .5 \text{ Arctan} \left(\frac{(2 \text{ Strain C} - \text{Strain A} - \text{Strain B})}{(\text{Strain A} - \text{Strain B})} \right)$$

In the above

E is Young's Modulus

μ is Poisson's Ratio

$$K = E / (1 - \mu^2)$$

APPENDIX C

Sign Convention for Rectangular Rosette Strain Gage Analysis

APPENDIX C

SIGN CONVENTION FOR RECTANGULAR ROSETTE STRAIN GAGE ANALYSIS

ANGLE OF PRINCIPAL DIRECTION is the angle from the A-A direction measured clockwise to the direction of MAXIMUM PRINCIPAL STRESS.

APPENDIX D

Computer Results of Strain Test Data
Reduced to Stresses for Each Test Run

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 009

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	931.	1001.	23.7	26.8
50.	1433.	1248.	39.2	30.9
75.	0.	0.	0.0	0.0
100.	2331.	2006.	63.9	49.5
100.	1588.	1172.	45.4	26.8
75.	-742.	-835.	-18.6	-22.7
50.	802.	617.	22.7	14.4
25.	534.	372.	15.5	8.2

GAGE NUMBER 021

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	5937.	3505.	1216.	23.22	160.8	86.1	162.7
50.	10427.	5969.	2229.	25.24	277.5	151.2	290.9
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	23995.	12564.	5716.	26.17	633.5	322.5	679.4
100.	23612.	12362.	5625.	26.23	623.0	317.7	668.9
75.	-202.	-384.	91.	112.50	-10.5	-4.8	-10.5
50.	10728.	5740.	2494.	25.82	284.2	146.4	302.4
25.	5441.	2866.	1288.	26.23	143.5	73.7	154.1

GAGE NUMBER 022

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	6226.	5544.	641.	128.21	155.0	168.4	134.0
50.	12049.	9616.	1217.	126.26	267.0	299.5	231.6
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	26585.	21173.	2706.	125.13	583.7	665.1	511.0
100.	25926.	20698.	2614.	124.14	566.5	652.6	501.4
75.	-437.	-697.	130.	57.22	-17.2	-12.4	-9.6
50.	12215.	9889.	1163.	126.95	274.6	303.3	239.2
25.	6254.	5384.	435.	124.89	145.5	158.9	134.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNG'S MODULUS = 28300000. PSI.

POISSON'S RATIO = 0.260000

GAGE NUMBER 023

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B	C-C
					DIRECTION (MICRO-INCHES PER INCH)		
25.	5795.	4489.	653.	-10.11	161.7	107.2	124.4
50.	9727.	7729.	999.	-5.90	271.8	184.7	219.1
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	21847.	16835.	2506.	1.11	617.2	394.3	510.0
100.	20642.	16027.	2307.	4.56	580.9	378.0	495.7
75.	-656.	-1357.	351.	65.02	-36.4	-16.3	-14.4
50.	3324.	7510.	907.	2.72	260.3	179.9	223.9
25.	5024.	4088.	468.	4.62	139.7	98.6	122.5

GAGE NUMBER 024

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN H-B DIRECTION (MICRO-INCHES PER INCH)	C-C	
25.	4503.	3292.	605.	73.30	79.4	124.4	116.7
50.	7517.	5474.	1021.	89.10	124.4	215.3	171.3
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	17107.	12463.	2322.	90.80	283.3	490.0	383.7
100.	16398.	11818.	2290.	90.94	267.0	470.8	365.6
75.	-643.	-711.	34.	-9.22	-16.3	-19.1	-18.2
50.	7690.	5814.	938.	92.30	134.9	218.2	173.2
25.	4277.	3189.	544.	99.22	74.6	120.6	90.0

GAGE NUMBER 025

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2083.	2963.	46.4	85.6
50.	3441.	5154.	74.2	150.5
75.	0.	0.	0.0	0.0
100.	6599.	10118.	140.2	296.9
100.	5792.	9150.	120.6	270.1
75.	-806.	-968.	-19.6	-26.8
50.	2926.	4408.	62.9	128.9
25.	1491.	2255.	32.0	66.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 026

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2121.	2886.	48.5	82.5
50.	3446.	4951.	76.3	143.3
75.	0.	0.	0.0	0.0
100.	6648.	9635.	146.4	279.4
100.	5850.	8698.	126.8	253.6
75.	-798.	-937.	-19.6	-25.8
50.	3308.	4419.	76.3	125.8
25.	1506.	2200.	33.0	63.9

GAGE NUMBER 027

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2188.	2582.	53.6	71.1
50.	3784.	4456.	92.8	122.7
75.	0.	0.	0.0	0.0
100.	7199.	8611.	175.3	238.1
100.	6322.	7595.	153.6	210.3
75.	-877.	-1016.	-21.6	-27.8
50.	3144.	3677.	77.3	101.0
25.	1619.	1851.	40.2	50.5

GAGE NUMBER 028

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1394.	1996.	30.9	57.7
50.	2346.	3411.	51.5	99.0
75.	0.	0.	0.0	0.0
100.	4494.	6624.	97.9	192.8
100.	3862.	5876.	82.5	172.2
75.	-632.	-748.	-15.5	-20.6
50.	1911.	2860.	41.2	83.5
25.	999.	1485.	21.6	43.3

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 029

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1017.	994.	26.8	25.8
50.	1468.	1607.	37.1	43.3
75.	0.	0.	0.0	0.0
100.	2319.	3083.	53.6	87.6
100.	1570.	2334.	34.0	68.0
75.	-749.	-749.	-19.6	-19.6
50.	1135.	1112.	29.9	28.9
25.	450.	496.	11.3	13.4

GAGE NUMBER 030

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2307.	4159.	43.3	125.8
50.	1678.	1516.	45.4	38.1
75.	0.	0.	0.0	0.0
100.	2770.	7401.	29.9	236.1
100.	2309.	7311.	14.4	237.1
75.	-461.	-91.	-15.5	1.0
50.	1339.	1223.	36.1	30.9
25.	366.	1408.	0.0	46.4

GAGE NUMBER 031

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	802.	2076.	9.3	66.0
50.	1258.	3828.	9.3	123.7
75.	0.	0.	0.0	0.0
100.	2264.	8145.	5.2	267.0
100.	1482.	7271.	-14.4	243.3
75.	-782.	-874.	-19.6	-23.7
50.	737.	3284.	-4.1	109.3
25.	438.	1573.	1.0	51.5

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 032

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	5123.	6350.	122.7	177.3
50.	9818.	12064.	236.1	336.1
75.	0.	0.	0.0	0.0
100.	19753.	24917.	469.1	699.0
100.	19121.	24169.	453.6	678.4
75.	-632.	-748.	-15.5	-20.6
50.	9604.	11804.	230.9	328.9
25.	5175.	6101.	126.8	168.0

GAGE NUMBER 033

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3745.	3745.	97.9	97.9
50.	6709.	6617.	176.3	172.2
75.	0.	0.	0.0	0.0
100.	13711.	13572.	359.8	353.6
100.	12914.	12752.	339.2	332.0
75.	-797.	-820.	-20.6	-21.6
50.	6205.	6135.	162.9	159.8
25.	3225.	3202.	84.5	83.5

GAGE NUMBER 034

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3163.	3302.	81.4	87.6
50.	6006.	6492.	152.6	174.2
75.	0.	0.	0.0	0.0
100.	12182.	12854.	312.4	342.3
100.	11890.	12515.	305.2	333.0
75.	-292.	-339.	-7.2	-9.3
50.	5783.	6084.	148.5	161.9
25.	2685.	3032.	67.0	82.5

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 036

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	792.	468.	162.	84.35	9.4	23.5	17.9
50.	956.	268.	344.	84.69	0.9	31.1	18.8
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	1636.	20.	808.	87.00	-14.1	57.4	25.4
100.	754.	-790.	772.	88.82	-34.8	33.9	0.9
75.	-784.	-907.	62.	-29.52	-20.7	-23.5	-24.5
50.	275.	-491.	383.	86.83	-19.8	14.1	-0.9
25.	231.	-159.	195.	110.30	-5.6	7.5	-4.7

GAGE NUMBER 040

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	682.	218.	232.	74.97	2.8	20.7	16.9
50.	995.	229.	383.	86.83	-0.9	32.9	17.9
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	1566.	-126.	846.	89.28	-18.8	56.5	19.8
100.	910.	-802.	856.	90.35	-36.7	39.5	0.9
75.	-632.	-699.	33.	125.78	-17.9	-16.9	-18.8
50.	480.	-408.	444.	90.00	-18.8	20.7	0.9
25.	104.	-320.	212.	92.86	-12.2	6.6	-3.8

GAGE NUMBER 044

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2126.	4025.	38.1	122.7
50.	4305.	7917.	79.4	240.2
75.	0.	0.	0.0	0.0
100.	9850.	18024.	182.5	546.4
100.	9305.	17386.	169.1	528.9
75.	-545.	-638.	-13.4	-17.5
50.	4403.	7622.	85.6	228.9
25.	2050.	3509.	40.2	105.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 048

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B	C-C
					DIRECTION (MICRO-INCHES PER INCH)		
25.	3580.	2897.	342.	-38.64	88.0	81.3	69.9
50.	5686.	4487.	600.	-37.73	139.7	126.3	107.2
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	11780.	8934.	1423.	-37.56	287.1	254.5	209.6
100.	10693.	7898.	1397.	-37.87	258.4	227.8	182.8
75.	-1031.	-1092.	30.	67.50	-28.7	-26.8	-26.8
50.	5080.	3923.	579.	-37.47	124.4	111.0	92.8
25.	2896.	2338.	279.	-37.18	71.8	65.1	56.5

GAGE NUMBER 049

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B	C-C
					DIRECTION (MICRO-INCHES PER INCH)		
25.	6272.	3389.	1441.	-34.97	148.3	104.3	66.0
50.	10752.	5314.	2719.	-35.42	249.8	170.3	95.7
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	24716.	11478.	6619.	-33.99	583.7	362.7	200.0
100.	23960.	10733.	6613.	-33.93	564.6	342.6	180.9
75.	-735.	-765.	15.	22.50	-19.1	-20.1	-19.1
50.	11153.	5425.	2864.	-34.56	262.2	171.3	97.6
25.	5747.	2817.	1465.	-33.79	136.8	87.1	51.7

GAGE NUMBER 050

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B	C-C
					DIRECTION (MICRO-INCHES PER INCH)		
25.	3186.	1080.	1053.	75.93	14.4	97.1	77.9
50.	5360.	1626.	1867.	75.09	19.2	163.5	132.7
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	11982.	3499.	4242.	75.12	38.5	366.3	296.2
100.	11560.	2854.	4353.	75.13	20.2	356.7	284.6
75.	-422.	-644.	111.	75.47	-18.3	-9.6	-11.5
50.	5556.	1394.	2081.	76.92	7.7	174.0	131.7
25.	2826.	778.	1024.	77.53	5.8	88.5	66.3

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 051

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1224.	3586.	10.3	115.5
50.	1979.	6379.	11.3	207.2
75.	0.	0.	0.0	0.0
100.	3053.	12639.	-8.2	418.6
100.	2272.	11882.	-28.9	399.0
75.	-780.	-757.	-20.6	-19.6
50.	1279.	5818.	-8.2	193.8
25.	763.	2824.	1.0	92.8

GAGE NUMBER 052

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2984.	4073.	68.0	116.5
50.	5424.	7508.	122.7	215.5
75.	0.	0.	0.0	0.0
100.	11110.	15463.	250.5	444.3
100.	10149.	14571.	224.7	421.6
75.	-961.	-892.	-25.8	-22.7
50.	4771.	7017.	104.1	204.1
25.	2409.	3544.	52.6	103.1

GAGE NUMBER 053

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	743.	3081.	-2.1	102.1
50.	1128.	5574.	-11.3	186.6
75.	0.	0.	0.0	0.0
100.	1813.	11237.	-39.2	380.4
100.	1056.	10457.	-58.8	359.8
75.	-757.	-780.	-19.6	-20.6
50.	640.	5155.	-24.7	176.3
25.	372.	2664.	-11.3	90.7

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 054

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3262.	3795.	80.4	104.1
50.	5894.	6959.	144.3	191.8
75.	0.	0.	0.0	0.0
100.	12175.	14398.	297.9	396.9
100.	11561.	13830.	281.4	382.5
75.	-615.	-568.	-16.5	-14.4
50.	5532.	6690.	134.0	185.6
25.	2797.	3353.	68.0	92.8

GAGE NUMBER 055

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	4156.	1139.	1509.	51.62	53.8	84.6	134.6
50.	7091.	1220.	2935.	50.94	81.7	135.6	236.5
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	16038.	1392.	7323.	50.44	166.3	289.4	548.1
100.	15558.	953.	7303.	50.24	156.7	275.0	535.6
75.	-405.	-515.	55.	-5.65	-9.6	-14.4	-12.5
50.	7359.	989.	3185.	50.77	80.8	137.5	248.1
25.	3792.	657.	1568.	49.96	46.2	70.2	126.9

GAGE NUMBER 056

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2668.	4428.	53.6	132.0
50.	4743.	8031.	93.8	240.2
75.	0.	0.	0.0	0.0
100.	9773.	16603.	192.8	496.9
100.	9055.	15862.	174.2	477.3
75.	-718.	-741.	-18.6	-19.6
50.	4413.	7770.	84.5	234.0
25.	2251.	4057.	42.3	122.7

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNG'S MODULUS = 28300000. PSI.

POISSON'S RATIO = 0.260000

GAGE NUMBER 057

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	4692.	7609.	95.9	225.8
50.	8550.	13922.	174.2	413.4
75.	0.	0.	0.0	0.0
100.	17917.	29749.	359.8	886.6
100.	17065.	28827.	338.1	861.9
75.	-852.	-922.	-21.6	-24.7
50.	8197.	13685.	163.9	408.2
25.	4178.	6980.	83.5	208.2

GAGE NUMBER 058

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3348.	5247.	70.1	154.6
50.	6261.	9943.	129.9	293.8
75.	0.	0.	0.0	0.0
100.	13242.	21532.	270.1	639.2
100.	12784.	21004.	258.8	624.7
75.	-458.	-528.	-11.3	-14.4
50.	6238.	9966.	128.9	294.8
25.	3307.	5090.	70.1	149.5

GAGE NUMBER 059

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	4725.	4146.	128.9	103.1
50.	9096.	8054.	247.4	201.0
75.	0.	0.	0.0	0.0
100.	19490.	17058.	532.0	423.7
100.	19403.	16948.	529.9	420.6
75.	-87.	-110.	-2.1	-3.1
50.	9190.	8079.	250.5	201.0
25.	4702.	4169.	127.8	104.1

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 060

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2261.	3535.	47.4	104.1
50.	4112.	6612.	84.5	195.9
75.	0.	0.	0.0	0.0
100.	8244.	13755.	164.9	410.3
100.	7763.	13251.	152.6	396.9
75.	-481.	-504.	-12.4	-13.4
50.	4010.	6557.	81.4	194.8
25.	2166.	3393.	45.4	100.0

GAGE NUMBER 061

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1334.	2885.	20.6	89.7
50.	2201.	5211.	29.9	163.9
75.	0.	0.	0.0	0.0
100.	4210.	10693.	50.5	339.2
100.	3493.	10069.	30.9	323.7
75.	-717.	-624.	-19.6	-15.5
50.	1754.	4949.	16.5	158.8
25.	839.	2552.	6.2	82.5

GAGE NUMBER 062

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2178.	1646.	61.9	38.1
50.	3963.	2897.	113.4	66.0
75.	0.	0.	0.0	0.0
100.	7958.	5920.	226.8	136.1
100.	7485.	5447.	214.4	123.7
75.	-473.	-473.	-12.4	-12.4
50.	3756.	2552.	109.3	55.7
25.	1949.	1324.	56.7	28.9

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 063

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1729.	1938.	43.3	52.6
50.	3237.	3584.	81.4	96.9
75.	0.	0.	0.0	0.0
100.	6395.	7089.	160.8	191.8
100.	5731.	6333.	144.3	171.1
75.	-663.	-756.	-16.5	-20.6
50.	2881.	3112.	73.2	83.5
25.	1468.	1607.	37.1	43.3

GAGE NUMBER 064

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	4238.	2896.	671.	73.41	68.3	118.3	109.6
50.	7369.	5023.	1173.	71.62	120.2	203.8	193.3
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	17165.	10561.	3302.	68.83	253.8	471.2	461.5
100.	16741.	10286.	3227.	69.13	246.2	460.6	449.0
75.	-267.	-432.	82.	-33.40	-7.7	-10.6	-12.5
50.	7704.	5093.	1305.	70.52	122.1	212.5	203.8
25.	3847.	2551.	648.	71.57	60.6	106.7	101.0

GAGE NUMBER 065

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	7133.	4468.	1332.	-38.71	164.6	138.8	93.8
50.	12393.	7735.	2329.	-40.49	279.4	246.9	160.8
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	30051.	17232.	6410.	-40.17	666.0	570.3	336.8
100.	29656.	17151.	6253.	-40.60	654.5	569.4	336.8
75.	-55.	-421.	183.	65.12	-11.5	-1.0	0.0
50.	13139.	7941.	2599.	-41.44	290.0	261.2	160.8
25.	6978.	4514.	1232.	-42.00	156.0	144.5	95.7

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 066

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C
25.	3308.	1105.	1101.	95.65	9.6	48.1
50.	5668.	1613.	2027.	97.09	7.7	73.1
75.	0.	0.	0.	0.00	0.0	0.0
100.	12062.	2794.	4634.	98.12	-3.8	136.5
100.	11452.	2374.	4539.	98.01	-13.5	125.0
75.	-418.	-611.	97.	13.28	-9.6	-11.5
50.	5578.	1225.	2176.	97.33	-4.8	64.4
25.	2678.	594.	1042.	95.07	-2.9	34.6

GAGE NUMBER 067

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	755.	546.	21.6	12.4
50.	1258.	911.	36.1	20.6
75.	0.	0.	0.0	0.0
100.	2225.	1600.	63.9	36.1
100.	1830.	1205.	53.6	25.8
75.	-394.	-394.	-10.3	-10.3
50.	1069.	745.	30.9	16.5
25.	676.	467.	19.6	10.3

GAGE NUMBER 068

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-147.	108.	-6.2	5.2
50.	-343.	28.	-12.4	4.1
75.	0.	0.	0.0	0.0
100.	-1001.	-260.	-33.0	0.0
100.	-1333.	-638.	-41.2	-10.3
75.	-332.	-378.	-8.2	-10.3
50.	-611.	-217.	-19.6	-2.1
25.	-250.	-65.	-8.2	0.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNG'S MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 069

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	986.	986.	25.8	25.8
50.	1463.	1139.	41.2	26.8
75.	0.	0.	0.0	0.0
100.	2532.	1884.	72.2	43.3
100.	2121.	1427.	61.9	30.9
75.	-411.	-457.	-10.3	-12.4
50.	1188.	980.	33.0	23.7
25.	843.	774.	22.7	19.6

GAGE NUMBER 075

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-421.	66.	-15.5	6.2
50.	-433.	354.	-18.6	16.5
75.	0.	0.	0.0	0.0
100.	-645.	999.	-32.0	41.2
100.	-292.	1120.	-20.6	42.3
75.	352.	121.	11.3	1.0
50.	-283.	481.	-14.4	19.6
25.	-154.	193.	-7.2	8.2

GAGE NUMBER 076

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	499.	684.	11.3	19.6
50.	782.	874.	19.6	23.7
75.	0.	0.	0.0	0.0
100.	1264.	1496.	30.9	41.2
100.	546.	755.	12.4	21.6
75.	-718.	-741.	-18.6	-19.6
50.	175.	337.	3.1	10.3
25.	56.	102.	1.0	3.1

BALDWIN-LIYA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNG'S MODULUS = 28300000. PSI.

POISSON'S RATIO = 0.260000

GAGE NUMBER 077

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	757.	780.	19.6	20.6
50.	813.	882.	20.6	23.7
75.	0.	0.	0.0	0.0
100.	1514.	1561.	39.2	41.2
100.	726.	772.	18.6	20.6
75.	-789.	-789.	-20.6	-20.6
50.	332.	378.	8.2	10.3
25.	87.	110.	2.1	3.1

GAGE NUMBER 078

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-1332.	-521.	-42.3	-6.2
50.	-2514.	-916.	-80.4	-9.3
75.	0.	0.	0.0	0.0
100.	-5224.	-1912.	-167.0	-19.6
100.	-5059.	-1841.	-161.9	-18.6
75.	165.	72.	5.2	1.0
50.	-2389.	-884.	-76.3	-9.3
25.	-1174.	-364.	-38.1	-2.1

GAGE NUMBER 079

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-4896.	2491.	-195.9	133.0
50.	829.	7451.	-39.2	255.7
75.	0.	0.	0.0	0.0
100.	1729.	15066.	-77.3	516.5
100.	1731.	14513.	-72.2	496.9
75.	2.	-554.	5.2	-19.6
50.	-626.	7131.	-87.6	257.7
25.	-296.	3687.	-44.3	133.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIC = 0.260000

GAGE NUMBER 080

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3152.	4379.	71.1	125.8
50.	4980.	7597.	106.2	222.7
75.	0.	0.	0.0	0.0
100.	10049.	15421.	213.4	452.6
100.	9332.	14797.	193.8	437.1
75.	-717.	-624.	-19.6	-15.5
50.	4866.	7159.	106.2	208.2
25.	2575.	3733.	56.7	108.2

GAGE NUMBER 081

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	4143.	3703.	112.4	92.8
50.	7325.	7302.	191.8	190.7
75.	0.	0.	0.0	0.0
100.	16280.	17508.	414.4	469.1
100.	15088.	16177.	384.5	433.0
75.	-1192.	-1331.	-29.9	-36.1
50.	7206.	7855.	182.5	211.3
25.	3598.	3853.	91.8	103.1

GAGE NUMBER 082

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	5005.	5561.	125.8	150.5
50.	8674.	9462.	219.6	254.6
75.	0.	0.	0.0	0.0
100.	19475.	21489.	490.7	580.4
100.	18331.	20346.	460.8	550.5
75.	-1143.	-1143.	-29.9	-29.9
50.	8219.	9168.	206.2	248.5
25.	4326.	4742.	109.3	127.8

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 1 SHELL-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 084

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	66.	-282.	174.	82.98	-10.4	4.7	-0.9
50.	173.	-605.	389.	78.81	-21.6	10.4	0.9
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	195.	-1743.	969.	76.02	-58.4	17.9	0.0
100.	329.	-1841.	1085.	73.46	-60.2	20.7	6.6
75.	165.	-129.	147.	55.52	-1.9	2.8	6.6
50.	216.	-864.	540.	74.71	-29.2	12.2	3.8
25.	53.	-665.	359.	66.31	-18.8	2.8	3.8

GAGE NUMBER 085

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	226.	26.	100.	80.78	-0.9	7.5	4.7
50.	488.	16.	236.	84.85	-3.8	16.9	8.5
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	465.	-645.	555.	74.52	-23.5	18.8	10.4
100.	531.	-603.	567.	76.72	-23.5	21.6	10.4
75.	99.	9.	45.	112.50	0.0	2.8	0.0
50.	303.	-231.	267.	80.78	-10.4	12.2	4.7
25.	252.	-72.	162.	95.65	-4.7	9.4	0.9

GAGE NUMBER 086

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	335.	-659.	497.	89.39	-26.4	17.9	-3.8
50.	321.	-1328.	824.	89.39	-49.9	23.5	-13.2
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	256.	-3783.	2019.	87.00	-135.5	43.3	-36.7
100.	200.	-4051.	2126.	85.85	-144.0	43.3	-36.7
75.	-27.	-296.	135.	67.50	-8.5	0.0	0.0
50.	198.	-1926.	1062.	87.14	-69.6	24.5	-17.9
25.	-11.	-1105.	547.	85.00	-38.6	9.4	-10.4

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 021

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C
25.	232.	-232.	232.	73.15	-8.6	8.6 5.7
50.	-485.	-832.	173.	93.56	-24.9	-9.6 -18.2
75.	176.	-725.	450.	118.34	-18.2	3.8 -23.9
100.	-333.	-984.	325.	93.80	-31.6	-2.9 -19.1
100.	-599.	-1268.	335.	113.80	-34.4	-14.4 -35.4
75.	-400.	-918.	259.	110.82	-25.8	-8.6 -24.9
50.	9.	-1216.	613.	116.06	-32.5	1.0 -37.3
25.	-320.	-742.	211.	97.37	-23.0	-4.8 -16.3

GAGE NUMBER 022

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C
25.	167.	-313.	240.	95.15	-12.4	8.6 -3.8
50.	-665.	-1311.	323.	91.91	-40.2	-11.5 -26.8
75.	-575.	-1694.	559.	91.10	-54.5	-4.8 -30.6
100.	-629.	-2006.	688.	89.11	-65.1	-3.8 -33.5
100.	-1102.	-2448.	673.	80.20	-74.6	-18.2 -36.4
75.	-853.	-1928.	537.	81.87	-59.3	-13.4 -29.7
50.	-985.	-1870.	443.	75.47	-54.5	-20.1 -27.8
25.	-254.	-953.	350.	67.50	-26.8	-4.8 -4.8

GAGE NUMBER 023

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C
25.	81.	-44.	63.	60.48	-1.0	1.9 2.9
50.	-327.	-697.	185.	72.23	-20.1	-6.7 -8.6
75.	-305.	-757.	226.	77.33	-23.0	-4.8 -9.6
100.	-326.	-845.	260.	77.78	-25.8	-4.8 -10.5
100.	-330.	-878.	274.	77.22	-26.8	-4.8 -10.5
75.	-216.	-625.	204.	88.49	-20.1	-1.9 -10.5
50.	-118.	-541.	212.	78.02	-17.2	0.0 -4.8
25.	466.	119.	173.	59.87	3.8	11.5 14.4

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AFC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 024

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	338.	64.	137.	67.50	1.0	9.6	9.6
50.	148.	-551.	350.	67.50	-16.3	5.7	5.7
75.	691.	-252.	472.	74.97	-12.4	23.9	16.3
100.	249.	-724.	487.	68.39	-22.0	9.6	8.6
100.	-531.	-897.	183.	88.32	-26.8	-10.5	-18.2
75.	-189.	-763.	287.	96.50	-24.9	0.0	-15.3
50.	135.	-355.	245.	97.63	-13.4	7.7	-5.7
25.	1067.	251.	408.	125.78	11.5	23.0	0.0

GAGE NUMBER 025

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	435.	551.	10.3	15.5
50.	380.	566.	8.2	16.5
75.	319.	666.	5.2	20.6
100.	580.	997.	11.3	29.9
100.	359.	706.	6.2	21.6
75.	390.	714.	7.2	21.6
50.	239.	471.	4.1	14.4
25.	647.	693.	16.5	18.6

GAGE NUMBER 026

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	230.	322.	5.2	9.3
50.	160.	392.	2.1	12.4
75.	43.	391.	-2.1	13.4
100.	242.	705.	2.1	22.7
100.	130.	501.	0.0	16.5
75.	114.	438.	0.0	14.4
50.	121.	352.	1.0	11.3
25.	608.	654.	11.5	17.5

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 027

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	426.	402.	11.3	10.3
50.	435.	551.	10.3	15.5
75.	265.	424.	6.2	12.4
100.	420.	605.	9.3	17.5
100.	-76.	155.	-4.1	6.2
75.	-29.	226.	-3.1	8.2
50.	-6.	203.	-2.1	7.2
25.	472.	356.	13.4	8.2

GAGE NUMBER 028

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	253.	299.	6.2	8.2
50.	292.	339.	7.2	9.3
75.	24.	94.	0.0	3.1
100.	205.	228.	5.2	6.2
100.	-95.	-141.	-2.1	-4.1
75.	-71.	-48.	-2.1	-1.0
50.	-31.	-8.	-1.0	0.0
25.	-79.	-79.	-2.1	-2.1

GAGE NUMBER 029

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	291.	222.	8.2	5.2
50.	345.	207.	10.3	4.1
75.	124.	-84.	5.2	-4.1
100.	226.	-29.	8.2	-3.1
100.	-168.	-423.	-2.1	-13.4
75.	-81.	-313.	0.0	-10.3
50.	-49.	-188.	0.0	-6.2
25.	-120.	-235.	-2.1	-7.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 030

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	103.	173.	2.1	5.2
50.	39.	39.	1.0	1.0
75.	-46.	46.	-2.1	2.1
100.	-86.	7.	-3.1	1.0
100.	-143.	-212.	-3.1	-6.2
75.	-143.	-212.	-3.1	-6.2
50.	-72.	-165.	-1.0	-5.2
25.	161.	509.	1.0	16.5

GAGE NUMBER 031

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	191.	400.	3.1	12.4
50.	185.	486.	2.1	15.5
75.	-4.	320.	-3.1	11.3
100.	92.	578.	-2.1	19.6
100.	-208.	208.	-9.3	9.3
75.	-146.	225.	-7.2	9.3
50.	-123.	202.	-6.2	8.2
25.	41.	156.	0.0	5.2

GAGE NUMBER 032

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	19.	297.	-2.1	10.3
50.	-286.	247.	-12.4	11.3
75.	-780.	31.	-27.8	8.2
100.	-896.	146.	-33.0	13.4
100.	-961.	-104.	-33.0	5.2
75.	-875.	-111.	-29.9	4.1
50.	-191.	388.	-10.3	15.5
25.	-241.	83.	-9.3	5.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A = SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 033

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	488.	419.	13.4	10.3
50.	582.	443.	16.5	10.3
75.	534.	372.	15.5	8.2
100.	676.	467.	19.6	10.3
100.	211.	26.	7.2	-1.0
75.	298.	136.	9.3	2.1
50.	524.	107.	17.5	-1.0
25.	252.	182.	7.2	4.1

GAGE NUMBER 034

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	298.	136.	9.3	2.1
50.	392.	160.	12.4	2.1
75.	265.	11.	9.3	-2.1
100.	525.	224.	16.5	3.1
100.	369.	183.	11.3	3.1
75.	400.	191.	12.4	3.1
50.	86.	-7.	3.1	-1.0
25.	212.	143.	6.2	3.1

GAGE NUMBER 044

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	322.	230.	9.3	5.2
50.	408.	223.	12.4	4.1
75.	501.	130.	16.5	0.0
100.	853.	251.	27.8	1.0
100.	955.	307.	30.9	2.1
75.	925.	416.	28.9	6.2
50.	446.	145.	14.4	1.0
25.	416.	254.	12.4	5.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A = SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 048

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	353.	-206.	279.	0.00	1.9	1.9	-10.5
50.	279.	-609.	444.	131.52	-6.7	-1.9	-23.9
75.	328.	-731.	529.	132.09	-7.7	-2.9	-28.7
100.	529.	-821.	675.	130.42	-8.6	1.0	-33.5
100.	-288.	-1212.	462.	126.20	-25.8	-13.4	-39.2
75.	-154.	-1018.	432.	132.14	-17.2	-13.4	-34.4
50.	-679.	-1114.	218.	124.89	-26.8	-20.1	-32.5
25.	-42.	-506.	232.	128.30	-9.6	-4.8	-17.2

GAGE NUMBER 049

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-308.	-644.	168.	115.10	-17.2	-7.7	-18.2
50.	-589.	-1204.	307.	116.77	-31.6	-15.3	-34.4
75.	-867.	-1658.	395.	111.40	-45.9	-20.1	-45.0
100.	-1051.	-2206.	578.	111.75	-61.2	-23.9	-60.3
100.	-1095.	-2162.	534.	102.51	-64.1	-21.1	-52.6
75.	-871.	-1837.	483.	106.14	-53.6	-17.2	-46.9
50.	-584.	-1319.	368.	93.35	-41.1	-8.6	-26.8
25.	226.	-446.	336.	70.10	-14.4	8.6	6.7

GAGE NUMBER 050

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-32.	-188.	78.	28.15	-1.0	-4.8	0.0
50.	-340.	-616.	138.	25.67	-8.7	-16.3	-7.7
75.	-436.	-741.	153.	40.93	-14.4	-16.3	-8.7
100.	-675.	-1053.	189.	29.52	-18.3	-26.9	-15.4
100.	-672.	-1020.	174.	30.13	-18.3	-26.0	-15.4
75.	-405.	-625.	110.	39.35	-12.5	-14.4	-8.7
50.	-240.	-827.	293.	48.17	-15.4	-12.5	-1.0
25.	546.	79.	233.	51.70	5.8	10.6	18.3

BALDWIN=LIMA=HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT=(11-1)-1213

NO. 2 NOZZLE THRUST A = SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO =0.260000

GAGE NUMBER 051

GAGE FACTOR = 1.94

PER= CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-16.	=63.	0.0	=2.1
50.	63.	16.	2.1	0.0
75.	=261.	=330.	=6.2	=9.3
100.	=355.	=355.	=9.3	=9.3
100.	=991.	=783.	=27.8	=18.6
75.	=881.	=696.	=24.7	=16.5
50.	=787.	=671.	=21.6	=16.5
25.	=204.	=111.	=6.2	=2.1

GAGE NUMBER 052

GAGE FACTOR = 1.94

PER= CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	128.	267.	2.1	8.2
50.	113.	321.	1.0	10.3
75.	=69.	69.	=3.1	3.1
100.	=44.	280.	=4.1	10.3
100.	=517.	=193.	=16.5	=2.1
75.	=384.	=129.	=12.4	=1.0
50.	=416.	=254.	=12.4	=5.2
25.	16.	63.	0.0	2.1

GAGE NUMBER 053

GAGE FACTOR = 1.94

PER= CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	79.	79.	2.1	2.1
50.	8.	31.	0.0	1.0
75.	=260.	=213.	=7.2	=5.2
100.	=260.	=213.	=7.2	=5.2
100.	=638.	=545.	=17.5	=13.4
75.	=519.	=427.	=14.4	=10.3
50.	=457.	=411.	=12.4	=10.3
25.	=16.	=63.	0.0	=2.1

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 054

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	222.	291.	5.2	8.2
50.	175.	337.	3.1	10.3
75.	-140.	22.	-5.2	2.1
100.	-52.	249.	-4.1	9.3
100.	-517.	-193.	-16.5	-2.1
75.	-415.	-137.	-13.4	-1.0
50.	-456.	-294.	-13.4	-6.2
25.	-38.	78.	-2.1	3.1

GAGE NUMBER 055

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-103.	-596.	247.	56.60	-13.5	-4.8	1.0
50.	-572.	-1009.	219.	55.11	-24.0	-17.3	-11.5
75.	-621.	-1512.	445.	52.02	-32.7	-23.1	-8.7
100.	-1018.	-2034.	508.	56.92	-49.0	-30.8	-19.2
100.	-963.	-1832.	435.	58.28	-45.2	-27.9	-19.2
75.	-846.	-1802.	478.	54.22	-41.3	-27.9	-14.4
50.	-201.	-461.	130.	54.22	-14.4	-2.9	-8.7
25.	-52.	-205.	76.	67.50	-5.8	-1.0	-1.0

GAGE NUMBER 056

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	8.	31.	0.0	1.0
50.	-306.	-167.	-9.3	-3.1
75.	-881.	-696.	-24.7	-16.5
100.	-1093.	-839.	-30.9	-19.6
100.	-1581.	-1257.	-44.3	-29.9
75.	-1384.	-1060.	-39.2	-24.7
50.	-1078.	-893.	-29.9	-21.6
25.	-432.	-317.	-12.4	-7.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 057

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	283.	190.	8.2	4.1
50.	171.	-14.	6.2	-2.1
75.	-114.	-438.	0.0	-14.4
100.	-92.	-578.	2.1	-19.6
100.	-503.	-1035.	-8.2	-32.0
75.	-375.	-768.	-6.2	-23.7
50.	-357.	-589.	-7.2	-17.5
25.	15.	-54.	1.0	-2.1

GAGE NUMBER 058

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	39.	39.	1.0	1.0
50.	-8.	-31.	0.0	-1.0
75.	-354.	-238.	-10.3	-5.2
100.	-619.	-248.	-19.6	-3.1
100.	-675.	-350.	-20.6	-6.2
75.	-877.	-345.	-27.8	-4.1
50.	-729.	-335.	-22.7	-5.2
25.	-453.	-59.	-15.5	2.1

GAGE NUMBER 059

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-102.	-56.	-3.1	-1.0
50.	-267.	-128.	-8.2	-2.1
75.	-559.	-466.	-15.5	-11.3
100.	-519.	-427.	-14.4	-10.3
100.	-458.	-528.	-11.3	-14.4
75.	-521.	-544.	-13.4	-14.4
50.	-427.	-519.	-10.3	-14.4
25.	14.	-171.	2.1	-6.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 060

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-56.	-102.	-1.0	-3.1
50.	-126.	-150.	-3.1	-4.1
75.	-537.	-606.	-13.4	-16.5
100.	-647.	-693.	-16.5	-18.6
100.	-1210.	-1511.	-28.9	-42.3
75.	-1029.	-1376.	-23.7	-39.2
50.	-1013.	-1314.	-23.7	-37.1
25.	-571.	-849.	-12.4	-24.7

GAGE NUMBER 061

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	71.	48.	2.1	1.0
50.	23.	-23.	1.0	-1.0
75.	-291.	-222.	-8.2	-5.2
100.	-189.	-166.	-5.2	-4.1
100.	-1190.	-1097.	-32.0	-27.8
75.	-1103.	-987.	-29.9	-24.7
50.	-1142.	-1026.	-30.9	-25.8
25.	-930.	-884.	-24.7	-22.7

GAGE NUMBER 062

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	95.	141.	2.1	4.1
50.	126.	150.	3.1	4.1
75.	-31.	-8.	-1.0	0.0
100.	8.	31.	0.0	1.0
100.	-946.	-946.	-24.7	-24.7
75.	-914.	-821.	-24.7	-20.6
50.	-986.	-986.	-25.8	-25.8
25.	-882.	-813.	-23.7	-20.6

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 063

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	128.	267.	2.1	8.2
50.	136.	298.	2.1	9.3
75.	3.	234.	-2.1	8.2
100.	58.	336.	-1.0	11.3
100.	182.	252.	4.1	7.2
75.	245.	268.	6.2	7.2
50.	263.	564.	4.1	17.5
25.	330.	261.	9.3	6.2

GAGE NUMBER 064

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-74.	-184.	55.	50.65	-3.8	-2.9	-1.0
50.	-541.	-746.	102.	54.22	-18.3	-15.4	-12.5
75.	-534.	-863.	164.	56.60	-21.2	-15.4	-11.5
100.	-854.	-1279.	213.	56.98	-31.7	-24.0	-19.2
100.	-870.	-1299.	214.	65.46	-34.6	-22.1	-21.2
75.	-663.	-1029.	183.	67.50	-27.9	-16.3	-16.3
50.	-521.	-582.	31.	67.50	-15.4	-13.5	-13.5
25.	-313.	-496.	92.	67.50	-13.5	-7.7	-7.7

GAGE NUMBER 065

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-314.	-527.	106.	67.50	-14.4	-7.7	-7.7
50.	-788.	-1408.	310.	61.85	-36.4	-21.1	-17.2
75.	-706.	-1709.	502.	68.37	-47.8	-15.3	-16.3
100.	-1241.	-2309.	534.	77.49	-67.9	-24.9	-36.4
100.	-983.	-2164.	590.	84.75	-67.0	-15.3	-36.4
75.	-939.	-2025.	543.	76.46	-60.3	-17.2	-27.8
50.	-480.	-1350.	435.	73.55	-40.2	-7.7	-13.4
25.	-104.	-408.	152.	94.07	-13.4	0.0	-7.7

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 2 NOZZLE THRUST A - SHELL PRESSURE ZERO PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 066

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-52.	-205.	76.	49.07	-3.8	-2.9	0.0
50.	-462.	-531.	34.	54.22	-13.5	-12.5	-11.5
75.	-507.	-633.	63.	74.52	-17.3	-12.5	-13.5
100.	-883.	-993.	55.	84.35	-26.9	-22.1	-24.0
100.	-1072.	-1318.	123.	127.37	-32.7	-29.8	-36.5
75.	-818.	-1057.	119.	-42.40	-24.0	-25.0	-29.8
50.	-757.	-1045.	144.	-38.50	-22.1	-25.0	-29.8
25.	-404.	-404.	0.	0.00	-10.6	-10.6	-10.6

GAGE NUMBER 080

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	18.	180.	-1.0	6.2
50.	-6.	203.	-2.1	7.2
75.	-288.	13.	-10.3	3.1
100.	-248.	169.	-10.3	8.2
100.	35.	359.	-2.1	12.4
75.	66.	367.	-1.0	12.4
50.	-93.	93.	-4.1	4.1
25.	167.	306.	3.1	9.3

GAGE NUMBER 081

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	150.	126.	4.1	3.1
50.	-631.	40.	-22.7	7.2
75.	-1068.	43.	-38.1	11.3
100.	-996.	208.	-37.1	16.5
100.	-1621.	-626.	-51.5	-7.2
75.	-1769.	-518.	-57.7	-2.1
50.	-1378.	-475.	-44.3	-4.1
25.	-907.	-236.	-29.9	0.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO =0.260000

GAGE NUMBER 021

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B	C-C
					DIRECTION (MICRO-INCHES PER INCH)		
25.	-868.	-3267.	1199.	101.33	-103.3	-4.8	-74.6
50.	-1831.	-6294.	2231.	100.44	-199.0	-13.4	-141.6
75.	-2541.	-8694.	3076.	101.63	-272.7	-21.1	-201.0
100.	-3378.	-11480.	4051.	100.90	-361.7	-26.8	-261.2
100.	-3720.	-11834.	4057.	100.80	-371.3	-35.4	-269.9
75.	-2818.	-9845.	3514.	101.71	-309.1	-22.0	-227.8
50.	-2301.	-7434.	2566.	100.81	-233.5	-21.1	-169.4
25.	-1405.	-4377.	1486.	97.12	-139.7	-11.5	-91.9

GAGE NUMBER 022

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B	C-C
					DIRECTION (MICRO-INCHES PER INCH)		
25.	456.	-164.	310.	61.85	-3.8	11.5	15.3
50.	454.	-528.	491.	56.60	-9.6	7.7	19.1
75.	839.	-766.	802.	55.19	-11.5	13.4	34.4
100.	1023.	-1316.	1169.	53.55	-19.1	11.5	45.9
100.	303.	-2279.	1291.	54.22	-44.0	-7.7	28.7
75.	157.	-1841.	999.	54.41	-36.4	-7.7	20.1
50.	340.	-1145.	742.	56.05	-23.0	1.9	20.1
25.	82.	-778.	430.	51.50	-13.4	-4.8	9.6

GAGE NUMBER 023

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B	C-C
					DIRECTION (MICRO-INCHES PER INCH)		
25.	3010.	1162.	924.	-8.80	93.8	15.3	42.1
50.	5365.	1991.	1687.	-7.95	168.4	23.9	75.6
75.	7896.	2973.	2461.	-8.51	246.9	37.3	110.0
100.	10544.	3948.	3298.	-8.33	330.1	48.8	147.4
100.	10521.	3751.	3385.	-8.87	330.1	43.1	140.7
75.	8781.	3113.	2834.	-8.94	275.6	35.4	116.7
50.	6718.	2395.	2161.	-9.13	210.5	27.8	89.0
25.	3919.	1424.	1248.	-5.46	124.4	15.3	59.3

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO =0.260000

GAGE NUMBER 024

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-42.	-763.	360.	-36.32	-5.7	-15.3	-25.8
50.	-301.	-1053.	376.	134.18	-18.2	-17.2	-34.4
75.	620.	-1571.	1095.	127.03	-25.8	1.0	-59.3
100.	-68.	-2421.	1177.	130.27	-41.1	-23.9	-84.2
100.	35.	-2304.	1170.	124.78	-47.8	-11.5	-78.5
75.	-24.	-1806.	891.	125.13	-37.3	-10.5	-61.2
50.	9.	-1216.	613.	127.37	-23.0	-8.6	-42.1
25.	661.	-588.	625.	121.72	-11.5	13.4	-23.9

GAGE NUMBER 025

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	16.	63.	0.0	2.1
50.	80.	196.	1.0	6.2
75.	120.	235.	2.1	7.2
100.	-29.	226.	-3.1	8.2
100.	-723.	-538.	-20.6	-12.4
75.	-613.	-451.	-17.5	-10.3
50.	-409.	-340.	-11.3	-8.2
25.	-220.	-174.	-6.2	-4.1

GAGE NUMBER 026

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	63.	16.	2.1	0.0
50.	133.	64.	4.1	1.0
75.	150.	126.	4.1	3.1
100.	0.	0.	0.0	0.0
100.	-726.	-772.	-18.6	-20.6
75.	-576.	-646.	-14.4	-17.5
50.	-340.	-409.	-8.2	-11.3
25.	-151.	-243.	-3.1	-7.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C = SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 027

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	148.	9.	5.2	-1.0
50.	0.	0.	0.0	0.0
75.	165.	72.	5.2	1.0
100.	78.	-38.	3.1	-2.1
100.	-616.	-685.	-15.5	-18.6
75.	-498.	-567.	-12.4	-15.5
50.	-315.	-315.	-8.2	-8.2
25.	-135.	-181.	-3.1	-5.2

GAGE NUMBER 028

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	242.	34.	8.2	-1.0
50.	108.	-147.	5.2	-6.2
75.	124.	-84.	5.2	-4.1
100.	83.	-241.	5.2	-9.3
100.	-390.	-714.	-7.2	-21.6
75.	-232.	-556.	-3.1	-17.5
50.	-152.	-360.	-2.1	-11.3
25.	-80.	-196.	-1.0	-6.2

GAGE NUMBER 029

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	189.	166.	5.2	4.1
50.	125.	33.	4.1	0.0
75.	282.	73.	9.3	0.0
100.	265.	11.	9.3	-2.1
100.	-459.	-645.	-10.3	-18.6
75.	-364.	-503.	-8.2	-14.4
50.	-340.	-409.	-8.2	-11.3
25.	-182.	-252.	-4.1	-7.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO =0.260000

GAGE NUMBER 030

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-273.	-1501.	4.1	-50.5
50.	-187.	-720.	0.0	-23.7
75.	-163.	-626.	0.0	-20.6
100.	-61.	-570.	3.1	-19.6
100.	-11.	-265.	2.1	-9.3
75.	22.	-140.	2.1	-5.2
50.	-64.	-133.	-1.0	-4.1
25.	-33.	-125.	0.0	-4.1

GAGE NUMBER 031

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	9.	148.	-1.0	5.2
50.	207.	345.	4.1	10.3
75.	215.	377.	4.1	11.3
100.	262.	447.	5.2	13.4
100.	-337.	-175.	-10.3	-3.1
75.	-196.	-80.	-6.2	-1.0
50.	-196.	-80.	-6.2	-1.0
25.	-165.	-72.	-5.2	-1.0

GAGE NUMBER 032

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	31.	8.	1.0	0.0
50.	-14.	171.	-2.1	6.2
75.	-68.	186.	-4.1	7.2
100.	-193.	154.	-8.2	7.2
100.	-620.	-365.	-18.6	-7.2
75.	-487.	-302.	-14.4	-6.2
50.	-345.	-207.	-10.3	-4.1
25.	-243.	-151.	-7.2	-3.1

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C = SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO =0.260000

GAGE NUMBER 033

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	737.	367.	22.7	6.2
50.	1155.	738.	34.0	15.5
75.	1704.	1056.	50.5	21.6
100.	2160.	1349.	63.9	27.8
100.	1474.	733.	45.4	12.4
75.	1247.	645.	38.1	11.3
50.	981.	518.	29.9	9.3
25.	479.	270.	14.4	5.2

GAGE NUMBER 034

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-102.	-56.	-3.1	-1.0
50.	-268.	-245.	-7.2	-6.2
75.	-435.	-551.	-10.3	-15.5
100.	-671.	-787.	-16.5	-21.6
100.	-829.	-945.	-20.6	-25.8
75.	-537.	-606.	-13.4	-16.5
50.	-450.	-496.	-11.3	-13.4
25.	-307.	-284.	-8.2	-7.2

GAGE NUMBER 044

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	322.	230.	9.3	5.2
50.	597.	389.	17.5	8.2
75.	627.	280.	19.6	4.1
100.	744.	281.	23.7	3.1
100.	177.	-217.	8.2	-9.3
75.	163.	-45.	6.2	-3.1
50.	132.	-53.	5.2	-3.1
25.	46.	-46.	2.1	-2.1

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO =0.260000

GAGE NUMBER 048

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	990.	-112.	551.	34.72	20.1	2.9	34.4
50.	1979.	254.	863.	29.64	48.8	9.6	62.2
75.	2928.	549.	1189.	27.65	75.6	15.3	89.0
100.	3749.	423.	1663.	28.57	94.7	14.4	116.7
100.	3031.	-177.	1604.	28.79	75.6	-1.0	97.6
75.	2620.	-21.	1320.	28.48	66.0	1.9	83.3
50.	2065.	21.	1022.	28.07	52.6	1.9	65.1
25.	1176.	-5.	590.	28.44	29.7	1.0	37.3

GAGE NUMBER 049

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	-1085.	-2319.	617.	93.50	-71.8	-17.2	-47.8
50.	-2021.	-4457.	1218.	92.28	-138.8	-30.6	-89.0
75.	-2949.	-6456.	1753.	91.23	-201.0	-45.0	-126.3
100.	-3957.	-8778.	2411.	91.53	-273.7	-59.3	-172.2
100.	-4371.	-9170.	2400.	93.09	-283.3	-70.8	-188.5
75.	-3526.	-7453.	1963.	92.51	-230.6	-56.5	-151.2
50.	-2582.	-5506.	1462.	93.59	-170.3	-41.1	-113.9
25.	-1411.	-3054.	821.	93.00	-94.7	-22.0	-62.2

GAGE NUMBER 050

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	-546.	-888.	171.	54.22	-21.2	-16.3	-11.5
50.	-1130.	-1701.	285.	59.74	-43.3	-30.8	-26.0
75.	-1566.	-2405.	419.	62.25	-62.5	-41.3	-36.5
100.	-2232.	-3210.	489.	67.50	-86.5	-55.8	-55.8
100.	-2339.	-3324.	492.	71.06	-91.3	-56.7	-60.6
75.	-1938.	-2732.	397.	68.60	-74.0	-48.1	-49.0
50.	-1475.	-2092.	309.	63.23	-54.8	-38.5	-35.6
25.	-757.	-1155.	199.	65.30	-30.8	-19.2	-18.3

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C = SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO =0.260000

GAGE NUMBER 051

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A=A DIRECTION (PSI)	STRESS IN B=B DIRECTION (PSI)	STRAIN IN A=A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B=B DIRECTION (MICRO-INCHES PER INCH)
25.	188.	49.	6.2	0.0
50.	87.	110.	2.1	3.1
75.	148.	9.	5.2	-1.0
100.	91.	-210.	5.2	-8.2
100.	-357.	-589.	-7.2	-17.5
75.	-167.	-306.	-3.1	-9.3
50.	-136.	-298.	-2.1	-9.3
25.	-103.	-173.	-2.1	-5.2

GAGE NUMBER 052

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A=A DIRECTION (PSI)	STRESS IN B=B DIRECTION (PSI)	STRAIN IN A=A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B=B DIRECTION (MICRO-INCHES PER INCH)
25.	1991.	926.	61.9	14.4
50.	3875.	1999.	118.6	35.1
75.	5348.	2616.	164.9	43.3
100.	7050.	3438.	217.5	56.7
100.	6427.	2838.	201.0	41.2
75.	5416.	2429.	169.1	36.1
50.	4115.	1799.	128.9	25.8
25.	2375.	1055.	74.2	15.5

GAGE NUMBER 053

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A=A DIRECTION (PSI)	STRESS IN B=B DIRECTION (PSI)	STRAIN IN A=A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B=B DIRECTION (MICRO-INCHES PER INCH)
25.	53.	-132.	3.1	-5.2
50.	240.	-200.	10.3	-9.3
75.	158.	-513.	10.3	-19.6
100.	85.	-795.	10.3	-28.9
100.	-569.	-1402.	-7.2	-44.3
75.	-323.	-1018.	-2.1	-33.0
50.	-258.	-767.	-2.1	-24.7
25.	-137.	-415.	-1.0	-13.4

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO =0.260000

GAGE NUMBER 054

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-2231.	-726.	-72.2	-5.2
50.	-4228.	-1449.	-136.1	-12.4
75.	-6100.	-2140.	-195.9	-19.6
100.	-6587.	-2442.	-210.3	-25.8
100.	-6854.	-2687.	-217.5	-32.0
75.	-7033.	-2587.	-224.7	-26.8
50.	-5278.	-1897.	-169.1	-18.6
25.	-3102.	-1156.	-99.0	-12.4

GAGE NUMBER 055

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C	
25.	-71.	-701.	315.	74.52	-22.1	1.9	-2.9
50.	-362.	-1624.	631.	70.98	-48.1	-3.8	-8.7
75.	-406.	-2278.	936.	70.31	-67.3	-2.9	-8.7
100.	-656.	-3315.	1329.	68.49	-95.2	-8.7	-11.5
100.	-864.	-3585.	1360.	66.21	-99.0	-17.3	-13.5
75.	-670.	-2934.	1132.	65.95	-80.8	-13.5	-9.6
50.	-484.	-2016.	766.	69.79	-58.7	-6.7	-10.6
25.	-280.	-1265.	492.	63.94	-33.7	-6.7	-2.9

GAGE NUMBER 056

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-1375.	-912.	-40.2	-19.6
50.	-2466.	-1516.	-73.2	-30.9
75.	-3724.	-2427.	-109.3	-51.5
100.	-5184.	-3332.	-152.6	-70.1
100.	-5618.	-3765.	-163.9	-81.4
75.	-4597.	-3092.	-134.0	-67.0
50.	-3386.	-2252.	-99.0	-48.5
25.	-1941.	-1292.	-56.7	-27.8

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO =0.260000

GAGE NUMBER 057

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1061.	2960.	10.3	94.8
50.	1775.	5478.	12.4	177.3
75.	2359.	7615.	13.4	247.4
100.	3111.	10057.	17.5	326.8
100.	2449.	9418.	0.0	310.3
75.	2058.	7916.	0.0	260.8
50.	1570.	6039.	0.0	199.0
25.	855.	3403.	-1.0	112.4

GAGE NUMBER 058

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-305.	-50.	-10.3	1.0
50.	-502.	-247.	-15.5	-4.1
75.	-801.	-500.	-23.7	-10.3
100.	-1288.	-802.	-38.1	-16.5
100.	-1478.	-1085.	-42.3	-24.7
75.	-1179.	-832.	-34.0	-18.6
50.	-661.	-522.	-18.6	-12.4
25.	-362.	-269.	-10.3	-6.2

GAGE NUMBER 059

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-2345.	-1164.	-72.2	-19.6
50.	-4093.	-1939.	-126.8	-30.9
75.	-5755.	-2722.	-178.4	-43.3
100.	-7708.	-3725.	-238.1	-60.8
100.	-7559.	-3599.	-234.0	-57.7
75.	-6296.	-3008.	-194.8	-48.5
50.	-4672.	-2148.	-145.4	-33.0
25.	-2642.	-1183.	-82.5	-17.5

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000, PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 060

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	8.	31.	0.0	1.0
50.	94.	24.	3.1	0.0
75.	-80.	-196.	-1.0	-6.2
100.	-207.	-345.	-4.1	-10.3
100.	-625.	-834.	-14.4	-23.7
75.	-451.	-613.	-10.3	-17.5
50.	-325.	-464.	-7.2	-13.4
25.	-105.	-290.	-1.0	-9.3

GAGE NUMBER 061

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	156.	41.	5.2	0.0
50.	156.	41.	5.2	0.0
75.	-261.	-330.	-6.2	-9.3
100.	-254.	-416.	-5.2	-12.4
100.	-782.	-874.	-19.6	-23.7
75.	-474.	-590.	-11.3	-16.5
50.	-450.	-496.	-11.3	-13.4
25.	-213.	-260.	-5.2	-7.2

GAGE NUMBER 062

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	94.	24.	3.1	0.0
50.	258.	96.	8.2	1.0
75.	78.	-38.	3.1	-2.1
100.	211.	26.	7.2	-1.0
100.	-167.	-306.	-3.1	-9.3
75.	-88.	-227.	-1.0	-7.2
50.	-158.	-158.	-4.1	-4.1
25.	-64.	-133.	-1.0	-4.1

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C = SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO =0.260000

GAGE NUMBER 063

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-24.	-94.	0.0	-3.1
50.	71.	48.	2.1	1.0
75.	-56.	-102.	-1.0	-3.1
100.	-56.	-102.	-1.0	-3.1
100.	-585.	-677.	-14.4	-18.6
75.	-466.	-559.	-11.3	-15.5
50.	-300.	-370.	-7.2	-10.3
25.	-190.	-283.	-4.1	-8.2

GAGE NUMBER 064

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-193.	-469.	138.	64.33	-12.5	-4.8	-3.8
50.	-782.	-1497.	357.	57.51	-36.5	-23.1	-15.4
75.	-938.	-2004.	533.	60.88	-51.0	-26.0	-18.3
100.	-1366.	-2900.	767.	61.17	-74.0	-37.5	-26.9
100.	-1641.	-3286.	822.	59.97	-82.7	-46.2	-32.7
75.	-1468.	-2724.	628.	58.28	-67.3	-42.3	-29.8
50.	-1050.	-2112.	531.	58.28	-51.9	-30.8	-20.2
25.	-610.	-1229.	309.	57.39	-29.8	-18.3	-11.5

GAGE NUMBER 065

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-777.	-1492.	358.	61.37	-38.3	-21.1	-16.3
50.	-1202.	-2421.	610.	65.36	-65.1	-29.7	-26.8
75.	-1926.	-3490.	782.	71.41	-98.6	-43.1	-49.8
100.	-2746.	-5451.	1353.	67.82	-150.2	-64.1	-65.1
100.	-2852.	-5382.	1265.	69.57	-150.2	-65.1	-70.8
75.	-2163.	-4205.	1021.	69.63	-117.7	-48.8	-53.6
50.	-1611.	-2780.	585.	71.99	-78.5	-36.4	-42.1
25.	-1049.	-1660.	305.	70.36	-45.9	-24.9	-26.8

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO.12 NOZZLE THRUST C - SHELL PRESSURE 300 PSI

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 066

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	24.	-649.	336.	-42.24	-6.7	-9.6	-23.1
50.	-227.	-1390.	582.	-37.47	-14.4	-27.9	-46.2
75.	-131.	-1891.	880.	-41.83	-22.1	-30.8	-65.4
100.	-317.	-2699.	1191.	-42.92	-35.6	-43.3	-92.3
100.	-464.	-2956.	1246.	-42.76	-40.4	-49.0	-100.0
75.	-469.	-2363.	947.	-41.40	-31.7	-42.3	-78.8
50.	-303.	-1720.	709.	-41.06	-22.1	-30.8	-57.7
25.	-132.	-971.	419.	-39.06	-10.6	-18.3	-32.7

GAGE NUMBER 080

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	245.	268.	6.2	7.2
50.	560.	583.	14.4	15.5
75.	394.	394.	10.3	10.3
100.	363.	386.	9.3	10.3
100.	-417.	-371.	-11.3	-9.3
75.	-158.	-158.	-4.1	-4.1
50.	-205.	-228.	-5.2	-6.2
25.	-56.	-102.	-1.0	-3.1

GAGE NUMBER 081

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	298.	136.	9.3	2.1
50.	337.	175.	10.3	3.1
75.	442.	465.	11.3	12.4
100.	591.	591.	15.5	15.5
100.	-222.	-291.	-5.2	-8.2
75.	-173.	-103.	-5.2	-2.1
50.	-102.	-56.	-3.1	-1.0
25.	31.	8.	1.0	0.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 021

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C
25.	7426.	4834.	1296.	38.03	174.2	216.3
50.	5275.	2997.	1139.	62.89	78.5	149.3
75.	4074.	1085.	1495.	80.14	4.8	89.9
100.	3121.	-1584.	2353.	87.37	-84.2	29.7
100.	3121.	-1584.	2353.	87.37	-84.2	29.7
75.	0.	0.	0.	0.00	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0

GAGE NUMBER 021

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C
25.	0.	0.	0.	0.00	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0
100.	2729.	-1815.	2272.	84.14	-87.1	32.5
100.	2729.	-1815.	2272.	84.14	-87.1	32.5
75.	3670.	135.	1767.	80.79	-24.9	74.6
50.	4678.	2053.	1313.	64.83	50.7	133.0
25.	6936.	3749.	1594.	43.06	144.5	210.5

GAGE NUMBER 022

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C
25.	12030.	9929.	1050.	119.63	263.2	246.9
50.	11700.	9892.	904.	115.88	257.4	250.7
75.	11632.	10105.	763.	106.19	255.5	266.0
100.	11397.	9977.	710.	91.77	247.9	277.5
100.	11397.	9977.	710.	91.77	247.9	277.5
75.	0.	0.	0.	0.00	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI;

POISSONS RATIO = 0.260000

GAGE NUMBER 022

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C	
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	10800.	9324.	738.	85.80	230.6	299.6	267.9
100.	10800.	9324.	738.	85.80	230.6	299.6	267.9
75.	10874.	9540.	667.	97.42	238.2	299.6	259.3
50.	11386.	9908.	739.	107.74	251.6	309.2	259.3
25.	11916.	9889.	814.	119.50	261.2	298.5	248.8

GAGE NUMBER 023

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C	
25.	12737.	8893.	1922.	-7.31	365.6	200.0	261.2
50.	15091.	9721.	2685.	-7.19	440.2	208.6	294.7
75.	17622.	10705.	3458.	-7.77	518.7	222.0	329.1
100.	20268.	11680.	4294.	-7.77	601.9	233.5	366.5
100.	20268.	11680.	4294.	-7.77	601.9	233.5	366.5
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

GAGE NUMBER 023

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C	
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	19786.	11321.	4233.	-6.45	590.4	223.0	364.6
100.	19786.	11321.	4233.	-6.45	590.4	223.0	364.6
75.	18049.	10679.	3685.	-6.16	535.9	215.3	340.6
50.	15987.	9961.	3013.	-5.66	470.8	207.7	312.9
25.	13222.	8955.	2134.	-2.04	384.7	195.2	283.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 024

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	7059.	5130.	963.	99.41	118.7	200.0	145.5
50.	6906.	4731.	1087.	99.18	106.2	198.1	136.9
75.	7691.	4351.	1670.	108.84	98.6	216.3	112.0
100.	6910.	3595.	1658.	111.46	83.3	191.4	87.1
100.	6910.	3595.	1658.	111.46	83.3	191.4	87.1
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

GAGE NUMBER 024

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	7401.	3935.	1783.	110.56	87.1	206.7	94.7
100.	7401.	3935.	1783.	110.56	87.1	206.7	94.7
75.	7379.	4301.	1537.	108.22	97.6	207.7	112.0
50.	7431.	4864.	1283.	105.63	111.9	209.6	131.1
25.	8158.	5418.	1370.	103.77	123.4	231.6	149.3

GAGE NUMBER 048

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	5476.	5176.	350.	-5.37	159.8	129.2	141.6
50.	6815.	5591.	612.	7.66	188.5	135.9	169.4
75.	7743.	5906.	919.	12.86	215.3	141.6	196.2
100.	8504.	5441.	1332.	18.90	234.4	140.7	223.9
100.	8504.	5441.	1332.	18.90	234.4	140.7	223.9
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 048

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	7214.	4642.	1286.	19.10	200.0	110.0	190.4
100.	7214.	4642.	1286.	19.10	200.0	110.0	190.4
75.	6815.	4639.	1088.	16.48	190.4	109.1	176.1
50.	6303.	4638.	832.	11.81	177.0	109.1	157.9
25.	5547.	4553.	497.	-2.53	154.1	110.0	130.1

GAGE NUMBER 049

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	8988.	3674.	2657.	-41.98	178.0	153.1	47.9
50.	7478.	2109.	2684.	131.55	111.0	139.7	6.7
75.	6108.	550.	2779.	125.99	48.8	125.3	-30.6
100.	4758.	-1427.	3093.	120.34	-23.9	111.0	-76.5
100.	4758.	-1427.	3093.	120.34	-23.9	111.0	-76.5
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

GAGE NUMBER 049

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	4754.	-1717.	3236.	122.52	-21.1	100.5	-90.9
100.	4754.	-1717.	3236.	122.52	-21.1	100.5	-90.9
75.	5797.	-198.	2997.	125.92	31.6	114.8	-53.6
50.	7139.	1354.	2892.	130.72	91.9	130.2	-16.3
25.	8828.	3288.	2770.	-42.88	167.5	149.3	35.4

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI;

POISSONS RATIO = 0.260000

GAGE NUMBER 050

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C	
25.	4776.	777.	2000.	73.46	-2.0	147.2	121.2
50.	4195.	-41.	2118.	73.12	-24.1	132.7	106.7
75.	3762.	-745.	2254.	72.78	-43.3	122.2	96.2
100.	3114.	-1569.	2342.	73.53	-67.3	107.7	76.9
100.	3114.	-1569.	2342.	73.53	-67.3	107.7	76.9
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

GAGE NUMBER 050

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B C-C
25.	0.	0.	0.	0.00	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0
100.	3209.	-1920.	2564.	75.81	-83.6	117.3
100.	3209.	-1920.	2564.	75.81	-83.6	117.3
75.	3603.	-1324.	2464.	75.58	-66.3	125.9
50.	4049.	-668.	2359.	75.19	-47.1	135.5
25.	4784.	253.	2265.	75.94	-23.1	154.8

GAGE NUMBER 055

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN		
					A-A	B-B DIRECTION	C-C
					(MICRO-INCHES	PER	INCH)
25.	6930.	623.	3154.	53.09	59.6	137.9	233.6
50.	6603.	-278.	3441.	54.35	33.6	131.8	227.8
75.	6523.	-898.	3710.	55.49	14.4	132.7	227.8
100.	6264.	-1927.	4096.	56.32	-13.5	126.9	225.0
100.	6264.	-1927.	4096.	56.32	-13.5	126.9	225.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI;

POISSONS RATIO = 0.260000

GAGE NUMBER 055

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C
25.	0.	0.	0.	0.00	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0
100.	6357.	-2456.	4407.	55.33	-18.2	120.2
100.	6357.	-2456.	4407.	55.33	-18.2	120.2
75.	6573.	-1831.	4202.	54.68	0.0	124.0
50.	6741.	-894.	3818.	54.32	22.1	130.8
25.	7039.	-231.	3633.	52.50	47.1	130.8

GAGE NUMBER 064

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C
25.	7172.	4557.	1308.	70.81	107.7	199.0
50.	6552.	3559.	1497.	68.35	83.7	180.7
75.	6404.	3042.	1681.	68.26	69.2	177.8
100.	5972.	2154.	1909.	67.48	46.2	166.3
100.	5972.	2154.	1909.	67.48	46.2	166.3
75.	0.	0.	0.	0.00	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0

GAGE NUMBER 064

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C
25.	0.	0.	0.	0.00	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0
100.	6026.	1840.	2093.	66.46	39.4	166.3
100.	6026.	1840.	2093.	66.46	39.4	166.3
75.	6196.	2408.	1894.	66.59	54.8	170.2
50.	6618.	3015.	1801.	67.02	70.2	181.7
25.	7067.	3890.	1588.	68.04	92.3	194.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 065

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	10933.	6923.	2005.	-42.54	241.1	225.5	144.5
50.	10087.	6415.	1836.	134.49	214.3	217.2	134.0
75.	9198.	5510.	1844.	130.97	180.8	203.8	111.0
100.	7448.	4484.	1482.	123.02	129.2	182.8	95.7
100.	7448.	4484.	1482.	123.02	129.2	182.8	95.7
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

GAGE NUMBER 065

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	8284.	4562.	1861.	125.07	139.8	196.1	90.0
100.	8284.	4562.	1861.	125.07	139.8	196.1	90.0
75.	9321.	5391.	1965.	128.38	172.3	212.4	107.2
50.	10581.	6104.	2239.	133.09	211.5	224.8	118.7
25.	11573.	6799.	2387.	-43.95	244.1	236.3	134.0

GAGE NUMBER 066

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	5433.	1225.	2104.	101.65	1.0	173.1	50.0
50.	4932.	732.	2100.	105.14	-6.7	154.8	26.9
75.	4946.	312.	2317.	102.14	-14.4	151.9	7.7
100.	4655.	-391.	2523.	110.93	-27.9	139.4	-19.2
100.	4655.	-391.	2523.	110.93	-27.9	139.4	-19.2
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 12A COMBINED NOZZLE THRUST C AND 300 PSI SHELL PRESSURE LOADING

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 066

GAGE FACTOR = 2.00

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A DIRECTION (MICRO-INCHES PER INCH)	B-B DIRECTION (MICRO-INCHES PER INCH)	C-C DIRECTION (MICRO-INCHES PER INCH)
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	4385.	-1001.	2693.	110.88	-45.2	133.7	-35.6
100.	4385.	-1001.	2693.	110.88	-45.2	133.7	-35.6
75.	4470.	-497.	2483.	108.44	-36.5	140.4	-14.4
50.	4757.	23.	2367.	105.99	-26.9	151.9	6.7
25.	5085.	613.	2236.	102.73	-15.4	164.4	31.7

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 001

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-486.	-185.	-15.5	-2.1
50.	-814.	-212.	-26.8	0.0
75.	-1377.	-358.	-45.4	0.0
100.	-1971.	-513.	-64.9	0.0
100.	-1514.	-102.	-52.6	10.3
75.	-936.	-10.	-33.0	8.2
50.	-459.	143.	-17.5	9.3
25.	-226.	29.	-8.2	3.1

GAGE NUMBER 002

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-1651.	-1188.	-47.4	-26.8
50.	-3127.	-2038.	-91.8	-43.3
75.	-5466.	-3405.	-161.9	-70.1
100.	-7835.	-4663.	-234.0	-92.8
100.	-7278.	-3643.	-223.7	-61.9
75.	-4909.	-2385.	-151.5	-39.2
50.	-2697.	-1285.	-83.5	-20.6
25.	-1387.	-623.	-43.3	-9.3

GAGE NUMBER 003

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2684.	669.	88.7	-1.0
50.	5452.	1358.	180.2	-2.1
75.	9488.	2379.	313.4	-3.1
100.	13632.	3282.	451.5	-9.3
100.	14238.	3819.	468.0	4.1
75.	10007.	2806.	327.8	7.2
50.	5900.	1709.	192.8	6.2
25.	3130.	931.	102.1	4.1

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 004

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3720.	3535.	99.0	90.7
50.	7494.	7054.	200.0	180.4
75.	12807.	12228.	340.2	314.4
100.	16254.	17180.	416.5	457.7
100.	16483.	17502.	421.6	467.0
75.	13109.	12715.	346.4	328.9
50.	7686.	7454.	203.1	192.8
25.	3949.	3857.	104.1	100.0

GAGE NUMBER 005

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-311.	-635.	-5.2	-19.6
50.	-150.	-914.	3.1	-30.9
75.	-493.	-1558.	-3.1	-50.5
100.	-891.	-2303.	-10.3	-73.2
100.	-643.	-1801.	-6.2	-57.7
75.	-418.	-1159.	-4.1	-37.1
50.	-53.	-539.	3.1	-18.6
25.	-96.	-258.	-1.0	-8.2

GAGE NUMBER 006

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-1602.	-1000.	-47.4	-20.6
50.	-3068.	-1702.	-92.8	-32.0
75.	-5423.	-3015.	-163.9	-56.7
100.	-7785.	-4358.	-235.1	-82.5
100.	-7383.	-3933.	-224.7	-71.1
75.	-5084.	-2722.	-154.6	-49.5
50.	-2981.	-1592.	-90.7	-28.9
25.	-1522.	-804.	-46.4	-14.4

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 007

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2394.	681.	78.4	2.1
50.	4796.	1276.	157.7	1.0
75.	8498.	2501.	277.3	10.3
100.	12136.	3476.	396.9	11.3
100.	12498.	3745.	407.2	17.5
75.	8671.	2605.	202.5	12.4
50.	5063.	1521.	164.9	7.2
25.	2606.	824.	84.5	5.2

GAGE NUMBER 008

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	4581.	5276.	113.4	144.3
50.	8690.	8736.	226.8	228.9
75.	15002.	13937.	402.1	354.6
100.	20965.	20038.	556.7	515.5
100.	16553.	4304.	545.4	0.0
75.	12594.	4004.	408.2	25.8
50.	7413.	2365.	240.2	15.5
25.	3642.	655.	122.7	-10.3

GAGE NUMBER 009

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2304.	1008.	72.2	14.4
50.	4577.	2007.	143.3	28.9
75.	7903.	3689.	245.4	57.7
100.	11329.	5309.	351.5	83.5
100.	11851.	5970.	363.9	102.1
75.	8290.	4169.	254.6	71.1
50.	4816.	2478.	147.4	43.3
25.	2399.	1149.	74.2	18.6

BALDWIN-LI 1A-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNG'S MODULUS = 28300000. PSI,

POISSON'S RATIO = 0.260000

GAGE NUMBER 010

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3780.	3317.	103.1	82.5
50.	7418.	6538.	202.1	162.9
75.	12883.	11285.	351.5	280.4
100.	18538.	16315.	505.2	406.2
100.	18932.	16709.	515.5	416.5
75.	13261.	11617.	381.9	288.7
50.	7882.	6863.	215.5	170.1
25.	3938.	3474.	107.2	86.6

GAGE NUMBER 011

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3981.	4653.	97.9	127.8
50.	7830.	9242.	191.8	254.6
75.	13552.	16215.	329.9	448.5
100.	19557.	24049.	470.1	670.1
100.	19873.	24481.	477.3	682.5
75.	13926.	16866.	337.1	468.0
50.	8180.	9917.	197.9	275.3
25.	4165.	5021.	101.0	139.2

GAGE NUMBER 012

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	4774.	4334.	128.9	109.3
50.	9241.	8500.	248.3	215.5
75.	16058.	14970.	429.9	381.4
100.	23596.	21744.	634.0	551.5
100.	23868.	22340.	638.1	570.1
75.	16527.	15763.	439.2	405.2
50.	9812.	9349.	260.8	240.2
25.	4996.	4742.	133.0	121.6

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 013

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2929.	2512.	80.4	61.9
50.	5804.	5156.	157.7	128.9
75.	10287.	9268.	278.4	233.0
100.	14598.	13394.	392.8	339.2
100.	15253.	14119.	409.3	358.8
75.	10646.	9974.	284.5	254.6
50.	6280.	5863.	168.0	149.5
25.	3113.	2998.	82.5	77.3

GAGE NUMBER 014

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1010.	1080.	25.8	28.9
50.	2840.	2956.	73.2	78.4
75.	6127.	6174.	159.8	161.9
100.	10116.	10070.	264.9	262.9
100.	11164.	11072.	292.8	288.7
75.	7389.	7435.	192.8	194.8
50.	4171.	4148.	109.3	108.2
25.	2137.	2160.	55.7	56.7

GAGE NUMBER 015

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	114.	438.	0.0	14.4
50.	1180.	1620.	26.8	46.4
75.	2979.	3605.	72.2	100.0
100.	5441.	6229.	135.1	170.1
100.	6442.	7160.	161.9	193.8
75.	4342.	4805.	109.3	129.9
50.	2407.	2639.	60.8	71.1
25.	1404.	1474.	36.1	39.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 016

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	137.	415.	1.0	13.4
50.	984.	1539.	20.6	45.4
75.	2566.	3585.	57.7	103.1
100.	4590.	6095.	106.2	173.2
100.	5386.	6915.	126.8	194.8
75.	3520.	4562.	82.5	128.9
50.	1892.	2563.	43.3	73.2
25.	949.	1180.	22.7	33.0

GAGE NUMBER 017

GAGE FACTOR = 2.09

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)
25.	596.	21.1
50.	1760.	62.2
75.	4550.	160.8
100.	8395.	296.7
100.	8287.	292.8
75.	5714.	201.9
50.	3250.	114.8
25.	1733.	61.2

GAGE NUMBER 018

GAGE FACTOR = 2.09

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)
25.	894.	31.6
50.	2708.	95.7
75.	6337.	223.9
100.	4983.	176.1
100.	4956.	175.1
75.	7474.	264.1
50.	4198.	148.3
25.	2302.	81.3

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 019

GAGE FACTOR = 2.09

PER- CENT OF LOAD	STRESS I-I A-A DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)
25.	542.	19.1
50.	1489.	52.6
75.	3710.	131.1
100.	7041.	248.8
100.	7014.	247.8
75.	4848.	171.3
50.	2844.	100.5
25.	1571.	55.5

GAGE NUMBER 020

GAGE FACTOR = 2.09

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)
25.	812.	28.7
50.	2275.	80.4
75.	5362.	189.5
100.	9560.	337.8
100.	9153.	323.4
75.	6120.	216.3
50.	3412.	120.6
25.	1760.	62.2

GAGE NUMBER 036

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	STRAIN IN DIRECTION (MICRO-INCHES PER INCH)		
					A-A	B-B	C-C
25.	222.	-5549.	2985.	39.51	-45.2	-94.1	56.5
50.	959.	-4846.	2902.	39.75	-27.3	-74.4	76.2
75.	3256.	-3256.	3256.	38.43	32.9	-32.9	141.2
100.	6118.	-1583.	3851.	37.52	103.5	15.1	224.9
100.	6063.	-1060.	3562.	37.34	107.3	23.5	218.4
75.	1427.	-5314.	3371.	47.16	-62.1	-39.5	98.8
50.	-1490.	-11144.	4827.	53.86	-230.6	-99.8	39.5
25.	-2286.	-13228.	5471.	56.42	-297.4	-108.2	21.6

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 037

GAGE FACTOR = 2.01

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	3958.	380.	1789.	114.27	4.0	109.5	-3.0
50.	6490.	-592.	3541.	109.68	-44.8	199.0	-22.9
75.	11237.	-1458.	6348.	105.88	-112.4	368.2	-20.9
100.	15531.	-2213.	8872.	106.22	-159.2	507.5	-37.8
100.	14926.	-3167.	9047.	105.01	-195.0	502.5	-47.8
75.	10665.	-2597.	6631.	105.75	-146.3	357.2	-48.8
50.	5827.	-1984.	3906.	105.59	-98.5	199.0	-39.8
25.	2552.	-1487.	2019.	103.85	-65.7	93.5	-27.9

GAGE NUMBER 038

GAGE FACTOR = 2.01

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-31810.	-37972.	3081.	45.42	-915.4	-911.4	-776.1
50.	-30652.	-39186.	4267.	44.63	-925.4	-939.3	-742.2
75.	-32501.	-51481.	9490.	43.97	-1084.1	-1114.4	-676.6
100.	-30965.	-61398.	15216.	43.95	-1184.1	-1233.8	-531.3
100.	-33701.	-39616.	2957.	46.13	-976.1	-943.2	-543.2
75.	-26756.	-33495.	3364.	46.62	-797.0	-780.0	-638.8
50.	-21676.	-26176.	2250.	38.82	-647.8	-604.9	-724.3
25.	-10139.	-24224.	7092.	39.78	-508.5	-394.0	-762.1

GAGE NUMBER 039

GAGE FACTOR = 2.01

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	1323.	-5585.	3454.	28.98	25.9	-137.3	74.6
50.	685.	-11340.	6013.	30.43	-9.0	-269.7	94.5
75.	-372.	-19377.	9502.	32.37	-77.6	-438.8	124.4
100.	-747.	-27565.	13409.	33.45	-136.3	-604.9	179.1
100.	-639.	-25168.	12264.	34.75	-146.3	-529.3	174.1
75.	-857.	-16609.	7876.	33.52	-91.5	-365.2	94.5
50.	-301.	-8946.	4323.	31.55	-33.8	-208.0	50.7
25.	-10.	-5241.	2616.	24.75	7.0	-144.3	19.9

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 040

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

GAGE NUMBER 041

GAGE FACTOR = 2.01

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	-36090.	-108916.	36413.	49.63	-2159.2	-1636.8	-296.5
50.	-32116.	-91793.	29838.	52.14	-1950.2	-1293.5	-333.3
75.	-33015.	-91844.	29414.	52.42	-1970.1	-1298.5	-367.2
100.	-30668.	-84118.	26724.	57.08	-1990.0	-1014.9	-415.9
100.	-33100.	-79975.	23437.	56.27	-1880.5	-1079.6	-515.4
75.	-35366.	-95384.	30009.	43.27	-1631.8	-1791.0	-398.0
50.	-26130.	-77632.	25751.	49.14	-1522.3	-1194.0	-223.9
25.	-19700.	-66386.	23343.	50.72	-1333.3	-920.3	-107.3

GAGE NUMBER 045

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	2112.	536.	788.	-4.73	69.2	0.0	28.8
50.	4296.	1220.	1538.	-5.26	139.4	4.8	59.6
75.	7562.	2183.	2690.	-5.20	245.2	9.6	105.8
100.	10956.	3239.	3859.	-5.81	353.8	17.3	151.0
100.	11432.	3755.	3838.	-6.26	365.4	31.7	161.5
75.	7942.	2538.	2702.	-5.88	254.8	19.2	112.5
50.	4661.	1517.	1572.	-6.35	149.0	12.5	65.4
25.	2404.	722.	841.	-7.82	76.9	4.8	30.8

BALDWIN-LIYA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 046

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	4170.	3223.	473.	-25.26	110.0	83.3	80.4
50.	7894.	6050.	922.	-18.23	215.3	149.3	157.9
75.	13891.	10849.	1521.	-21.35	373.2	273.7	277.5
100.	17422.	15076.	1173.	-14.22	470.8	378.9	400.0
100.	17907.	15798.	1054.	-14.98	481.3	400.0	417.2
75.	14309.	11381.	1464.	-20.12	385.6	286.1	293.8
50.	8325.	6606.	860.	-18.43	225.8	164.6	172.2
25.	4212.	3327.	443.	-14.53	115.8	81.3	89.0

GAGE NUMBER 047

GAGE FACTOR = 2.09

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	3721.	3086.	317.	14.15	101.4	76.6	95.7
50.	7503.	6147.	678.	12.67	205.7	151.2	191.4
75.	13671.	10446.	1613.	23.85	363.6	267.0	368.4
100.	19915.	15986.	1964.	-5.84	555.0	383.7	451.7
100.	23403.	14145.	4629.	-33.09	574.2	407.7	302.4
75.	16985.	8559.	4213.	-37.31	383.7	284.2	153.1
50.	10496.	4509.	2993.	-38.78	224.9	167.5	66.0
25.	5983.	1629.	2177.	-40.45	114.8	84.2	3.8

GAGE NUMBER 067

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-2012.	-669.	-64.9	-5.2
50.	-3938.	-1345.	-126.8	-11.3
75.	-6781.	-2405.	-217.5	-22.7
100.	-9725.	-3404.	-312.4	-30.9
100.	-9495.	-3081.	-307.2	-21.6
75.	-6654.	-2138.	-215.5	-14.4
50.	-3804.	-1164.	-123.7	-6.2
25.	-1956.	-567.	-63.9	-2.1

BALONI -LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNG'S MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 068

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1694.	1578.	45.4	40.2
50.	3309.	3078.	88.7	78.4
75.	5752.	5405.	153.6	138.1
100.	8265.	7663.	221.6	194.8
100.	8346.	7976.	221.6	205.2
75.	5895.	5617.	156.7	144.3
50.	3515.	3306.	93.8	84.5
25.	1727.	1703.	45.4	44.3

GAGE NUMBER 069

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	725.	655.	19.6	16.5
50.	1419.	1419.	37.1	37.1
75.	2644.	2876.	67.0	77.3
100.	3794.	4604.	91.8	127.8
100.	4222.	5241.	101.0	146.4
75.	2956.	3628.	71.1	101.0
50.	1756.	2265.	41.2	63.9
25.	797.	820.	20.6	21.6

GAGE NUMBER 070

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1421.	2324.	28.9	69.1
50.	2716.	4499.	54.6	134.0
75.	4852.	8001.	97.9	238.1
100.	6814.	11283.	137.1	336.1
100.	7215.	11591.	148.5	343.3
75.	5127.	8160.	106.2	241.2
50.	3087.	4916.	63.9	145.4
25.	1546.	2357.	33.0	69.1

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000, PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 071

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	3429.	4101.	83.5	113.4
50.	6796.	8186.	164.9	226.8
75.	11838.	14223.	287.6	393.8
100.	16628.	20078.	403.1	556.7
100.	16889.	20408.	409.3	566.0
75.	11942.	14513.	288.7	403.1
50.	6978.	8437.	169.1	234.0
25.	3501.	4266.	84.5	118.6

GAGE NUMBER 072

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C	
25.	2972.	2176.	398.	6.26	84.6	50.0	71.2
50.	5920.	3751.	1085.	-23.31	159.6	93.3	91.3
75.	9870.	7082.	1394.	10.20	279.8	163.5	243.3
100.	14252.	10275.	1988.	10.00	403.8	237.5	351.0
100.	14924.	10963.	1981.	9.22	422.1	254.8	366.3
75.	10851.	8050.	1400.	8.52	306.7	187.5	265.4
50.	6160.	4614.	773.	7.70	174.0	107.7	150.0
25.	3171.	2345.	413.	3.00	90.4	53.8	74.0

GAGE NUMBER 073

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C	
25.	2281.	-38.	1160.	27.05	59.6	-1.0	71.2
50.	4607.	63.	2272.	25.39	125.0	-2.9	139.4
75.	7781.	162.	3809.	24.22	216.3	-8.7	230.8
100.	11600.	351.	5624.	25.70	312.5	0.0	351.9
100.	12269.	333.	5668.	25.59	330.8	14.4	369.2
75.	8529.	664.	3933.	25.62	229.8	10.6	256.7
50.	4764.	459.	2153.	22.70	135.6	1.0	136.5
25.	2551.	244.	1154.	25.92	68.3	4.8	76.9

BALDWIN-LI'A-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 074

GAGE FACTOR = 2.08

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	C-C STRAIN IN DIRECTION (MICRO-INCHES PER INCH)
25.	3641.	3456.	93.	-17.77	96.2	89.4	90.4
50.	7001.	6348.	326.	-27.89	182.7	166.3	162.5
75.	12156.	11378.	389.	-28.15	317.3	298.1	293.3
100.	17309.	15602.	854.	-35.78	442.3	418.3	394.2
100.	17783.	16121.	831.	-32.72	458.7	427.9	409.6
75.	12809.	11608.	600.	-26.15	335.6	302.9	298.1
50.	7094.	6769.	162.	-1.91	188.5	174.0	180.8
25.	3889.	3612.	138.	-19.33	102.9	93.3	94.2

GAGE NUMBER 075

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-4100.	157.	-146.4	43.3
50.	-8328.	170.	-295.8	82.5
75.	-22437.	-1924.	-775.2	138.1
100.	-10835.	2755.	-408.2	196.9
100.	-50958.	-7934.	-1727.8	187.6
75.	-6154.	2136.	-237.1	132.0
50.	-2864.	1326.	-113.4	73.2
25.	-1583.	638.	-61.8	37.1

GAGE NUMBER 076

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	1923.	1113.	57.7	21.6
50.	3808.	2303.	113.4	46.4
75.	6732.	4347.	197.9	91.8
100.	9597.	6055.	283.5	125.8
100.	9889.	5605.	297.9	107.2
75.	6825.	3583.	208.2	63.9
50.	3873.	1765.	120.6	26.8
25.	1875.	254.	63.9	-8.2

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000. PSI.

POISSONS RATIO = 0.260000

GAGE NUMBER 077

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	-1386.	-506.	-44.3	-5.2
50.	-2684.	-785.	-87.6	-3.1
75.	-4647.	-1267.	-152.6	-2.1
100.	-6643.	-1873.	-217.5	-5.2
100.	-6083.	-1290.	-203.1	10.3
75.	-4199.	-887.	-140.2	7.2
50.	-2329.	-431.	-78.4	6.2
25.	-1283.	-334.	-42.3	0.0

GAGE NUMBER 078

GAGE FACTOR = 1.94

PER- CENT OF LOAD	STRESS IN A-A DIRECTION (PSI)	STRESS IN B-B DIRECTION (PSI)	STRAIN IN A-A DIRECTION (MICRO-INCHES PER INCH)	STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)
25.	2144.	2075.	56.7	53.6
50.	3902.	3786.	103.1	97.9
75.	6967.	6596.	185.6	169.1
100.	8427.	8960.	215.5	239.2
100.	7814.	8509.	197.9	228.9
75.	6666.	6226.	178.4	158.8
50.	3893.	3638.	104.1	92.8
25.	1985.	1800.	53.6	45.4

GAGE NUMBER 083

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN B-B DIRECTION (MICRO-INCHES PER INCH)	C-C	
25.	1971.	369.	801.	105.48	0.0	61.2	12.2
50.	4072.	751.	1660.	105.73	0.0	126.1	24.5
75.	7674.	1649.	3013.	102.34	0.0	243.8	65.9
100.	11165.	2477.	4344.	101.38	0.0	356.7	103.5
100.	11673.	2652.	4511.	100.58	0.0	374.6	114.8
75.	7761.	1597.	3082.	103.46	0.0	244.7	60.2
50.	4584.	779.	1903.	107.07	0.0	140.2	22.6
25.	2375.	252.	1062.	111.69	0.0	68.7	1.9

BALDWIN-LIMA-HAMILTON STRAIN GAGE RESULTS
STEAM GENERATOR AEC CONTRACT NO. AT-(11-1)-1213

NO. 13 TUBE-SIDE HYDROSTATIC TEST

YOUNGS MODULUS = 28300000, PSI,

POISSONS RATIO = 0.260000

GAGE NUMBER 084

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	23701.	5094.	9304.	34.34	527.1	225.9	762.4
50.	19760.	15874.	1943.	56.19	432.9	498.8	545.9
75.	5125.	-4045.	4585.	32.01	103.5	-75.3	197.6
100.	-7507.	-10850.	1671.	17.35	-178.8	-301.2	-197.6
100.	-17641.	-21952.	2156.	39.35	-498.8	-536.5	-423.5
75.	-2415.	-12523.	5054.	41.70	-169.4	-221.2	28.2
50.	8782.	-1583.	5182.	39.12	141.2	47.1	320.0
25.	16214.	1783.	7215.	42.48	263.5	207.1	555.3

GAGE NUMBER 085

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	0.	0.	0.	0.00	0.0	0.0	0.0
100.	0.	0.	0.	0.00	0.0	0.0	0.0
75.	0.	0.	0.	0.00	0.0	0.0	0.0
50.	0.	0.	0.	0.00	0.0	0.0	0.0
25.	0.	0.	0.	0.00	0.0	0.0	0.0

GAGE NUMBER 086

GAGE FACTOR = 2.13

PER- CENT OF LOAD	MAXIMUM PRINCIPAL STRESS (PSI)	MINIMUM PRINCIPAL STRESS (PSI)	MAXIMUM SHEARING STRESS (PSI)	ANGLE OF PRINCIPAL DIRECTION (DEGREES)	A-A STRAIN IN DIRECTION (MICRO-INCHES PER INCH)	B-B	C-C
25.	-7547.	-11493.	1973.	67.72	-311.5	-186.4	-187.3
50.	-12629.	-21937.	4654.	70.39	-613.1	-291.8	-339.8
75.	-20148.	-36666.	8259.	76.46	-1071.3	-416.0	-576.0
100.	-27373.	-50183.	11405.	81.44	-1498.5	-513.8	-858.2
100.	-32443.	-52661.	10109.	81.67	-1545.5	-682.4	-984.9
75.	-24629.	-37938.	6654.	80.54	-1099.5	-538.4	-722.8
50.	-16584.	-23188.	3302.	77.69	-654.4	-386.8	-459.3
25.	-10759.	-13321.	1281.	61.78	-346.4	-283.3	-267.3

FIGURE 7
TYPICAL STRIP CHART
SHOWING TENSION (*22)
AND COMPRESSION (*24)
GAGES