FINAL REPORT
ON THE
EVALUATION OF AWS FIELD WELDING
ON STRUCTURAL AND MISCELLANEOUS STEEL
AT THE
WOLF CREEK GENERATING STATION

BECHTEL POWER COPRORATION
GAITHERSBURG, MARYLAND
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WOLF CREEK

AWS WELDING EVALUATION REPORT

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ATTACHMENT

Westinghouse Electric Corporation Letter SNP(KG)-503,
J. W. Irons and L. R. Benson to J. A. Bailey,
dated October 1, 1984

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WOLF CREEK

AWS WELDING EVALUATION REPORT

I. INTRODUCTION

On September 18, 1984 a reinspection of structurally significant AWS field welded joints (identified by Bechtel Power Corporation) was initiated at the Wolf Creek Generating Station by Kansas Gas and Electric (KG&E) Project Management. The reinspection was initiated to address concerns regarding AWS field welding as described in KG&E Corrective Action Report (CAR) 19.

The scope of the initial reinspection involved 6 structurally significant field welded joints in each of the 6 safety related buildings: Auxiliary Building, Reactor Building, Control Building, Diesel Generator Building, Fuel Building and Essential Service Water System (ESWS) Pumphouse. The results of this initial reinspection identified two missing welds (one weld on a pressurizer support in the Reactor Building, and one clip angle weld on a beam support in the Auxiliary Building), and various other deviations from AWS D1.1-75 welding requirements as described in this report.

As part of the evaluation of AWS field welding, Kansas Gas and Electric Project Management also initiated a separate reinspection of joints in the Reactor Building which had missing weld inspection records i.e. Miscellaneous/Structural Steel Weld Records (MSSWR). This reinspection identified missing welds on the containment cooler supports and missing brackets on the incore instrumentation supports. A potential significant deficiency was reported to NRC Region IV on September 18, 1984 in accordance with the requirements of 10CFR50.55(e).

As a result of the findings of these two reinspections, the program to reinspect structurally significant field-welded joints was expanded to include all such joints in the six safety related buildings at Wolf Creek. This report documents Bechtel's involvement in this program, which included the selection of joints to be reinspected and the structural evaluation of the as-built condition of the joints as described in the reinspection reports generated by DIC. The results of the evaluation did not identify any significant deficiencies in accordance with 10CFR50.55(e).

II. JOINT SELECTION

A. General

The joints included in the reinspection and evaluation program are all structurally·significant, AWS field weld joints, which:

1) support or potentially support safety related equipment and building components,
2) are located in the Reactor Building, Auxiliary Building, Control Building, Diesel Generator Building, Fuel Building or Essential Service Water System Pumphouse,
3) were installed under the structural steel erection contract (Bechtel Specification 10466-C122) or the miscellaneous steel erection contract (Bechtel Specification 10466-C132), and
4) were originally inspected under the Daniel International Corporation (DIC) "Miscellaneous/Structural Steel Weld Records" (MSSWR) Inspection Program.

For the purpose of this reinspection program, a joint is defined as the connection between two structural members. A joint may contain more than one weld, or a combination of welds and bolts. A joint may also be refered to as a connection.

AWS field welds for the following items were not considered to be structurally significant:

1) handrails
2) toeplates
3) grating
4) checkered plate
5) stair towers
6) ladders
7) monorails
8) temporary construction welds
9) temporary decking supports
10) plug welds in unused bolt holes
11) cask loading pit hatch covers
12) cask washdown pit hatch covers
13) Reactor Building bracket shims
14) Embedded beam to seat welds

A total of 2669 structurally significant joints were identified for reinspection. Appendix A identifies these joints and provides information on their locations, the nonconformance reports (NCR) on which any welding deviations from AWS D1.1 are documented, and a cross-reference to Bechtel engineering evaluations.

Most of the structurally significant joints were identified on the structural steel (American Bridge Company) and miscellaneous steel (Cives Steel Company) erection detail and field work drawings, and Bechtel detail drawing (C-OX Drawing Series). Appendix B lists the drawings which were reviewed in order to identify the structurally significant joints and indicates those drawings on which joints were identified. In addition, DIC reviewed field generated nonconformance reports (NCRs), field change requests (FCRs) and field fabrication requests. Those documents identifying field welds which DIC considered to have a potential structural significance were provided to Bechtel for review. Structurally significant joints identified by Bechtel on these documents were also included in the reinspection program. A listing of the documents submitted to Bechtel is included in Appendix C of this report.

B. Perspective on Field Welded Joints

In order to provide a perspective on the reinspection of field welded joints, Bechtel engineering made an independent count of the various joint types (i.e. shop welded, field bolted or field welded) required for the erection of miscellaneous and structural steel at Wolf Creek. The drawings listed in Appendix B of this report were used as the basis of this count, and the results are tabulated in Table 1. Approximately 11,150 total joints are required for the fabrication and erection of structural and miscellaneous steel.

Table 1 indicates that there are 2320 field weld joints while the reinspection program identified 2669 joints. There are two major reasons for this difference:

1) Table 1 does not include field welded joints required by field fabrication requests, NCRs and FCRs, and
2) miscellaneous differences in counting (i.e., when joints are partially shop welded and field welded, etc.).

Overall, even considering 2669 field welded joints instead of 2320, field welding accounts for less than 25 percent of the total joints required for fabrication and erection of structural and miscellaneous steel at Wolf Creek.

C. II/I WELDS

AWS field welds on seismic II/I items included in the miscellaneous/structural steel contracts were not included in the reinspection. These seismic II/I items are handrails, toe plates, grating, checkered plate, stairs, ladders and monorails. Typically these are shop welded, field bolted items which are designated seismic II/I only to assure that they will not fail during an earthquake. In general, they do not act as seismic supports for other items. Monorails were load tested as part of the Start-up procedures. Typically the seismic loads on these items are much less critical than the service loads imposed during construction. We believe that significant deficiencies in any field welds that may have been made on these types of items would have been identified during the construction period. In addition, we have not identified any welding deficiencies in the safety-related joints which have been inspected that would have resulted in a failure of those joints. We would expect the same results from a reinspection of welds on II/I items.

III. REINSPECTION RESULTS

A. General

All accessible joints identified by Bechtel as part of this reinspection program were reinspected by AWS certified weld inspectors under the direction of DIC and KG&E quality control organizations. The reinspections were performed to the existing welding criteria of AWS D1.1 and Bechtel Specifications 10466-C122 and 10466-C132, with the exception that some inspections were performed through paint. A reinspection report was generated for each joint indicating whether:

1) the welds on the joint were acceptable,
2) the type and extent of any deviation from AWS D1.1 and Bechtel Specification requirements (In this case the as-built condition of all welds on the joints was documented on the inspection report), or
3) the joint was inaccessible (i.e. embedded in concrete or obstructed by installed equipment.)

Of the 2669 joints identified for inspection 2386 joints were completely inspected, 166 joints were partially inaccessible, and 119 joints were totally inaccessible. All welds on 1293 joints were accepted by the inspectors, while welding deviations were noted on 1093 joints. Many of the deviation were very minor in nature, such as limited areas of lack of fusion or undercut, minor undersize, cold lap, etc.

All inspection reports were forwarded to Bechtel for engineering evaluation.

B. Summary of Reported Welding Deviations

Appendix D provides a synopsis of the inspection results for each joint. In order to accurately report the reinspector results, each straight line segment of a weld was identified, and the reinspection results were reported on a segment by segment basis. The number of weld segments on a joint which have a particular welding deviation is recorded in the appropriate column of Appendix D. A summary of the data in Appendix D is provided in this section:

1) Undersize

   A. Weld undersized for part of length - 68 joints

   B. Weld undersized on one leg (typically 1/16 inch or less) - 375 joints. The undersize occurred only on the return welds on 103 of these joints.

   C. Weld undersized full length (of weld segment) - 284 joints. The undersize occurred only on the clip angle return welds on 69 of these joints.

   D. Weld undersized due to fit-up/root gap - 29 joints.

   An engineering evaluation has identified only 5 joints (A102, A419, A431, RA, R039) in which the maximum calculated design stress exceeded the allowable as the result of undersized welds. These 5 joints are discussed further in Section VI.B.

2) Weld Defects

A. Overlap (typically limited to a small percentage of weld length) - 68 joints.

B. Incomplete penetration - 24 joints

C. Lack of fusion (typically limited to a small percentage of weld length) - 91 joints

D. Excessive reinforcement - 6 joints

E. Edge consumption (i.e. weld size in excess of AWS D1.1 , Paragraph 2.7.14) - 99 joints (occurred on the return welds only on 48 of these joints.

F. Cracks - 3 joints (all on beam to beam seat welds)

G. Gouge/grinding -14 joints

H. Slag - 9 joints

I. Porosity - 5 joints

J. Arc strike - 3 joints

K. Convexity - 3 joints

L. Other - 53 joints

Essentially all of the weld defects were very minor in nature. Only 1 joint (C146) had calculated design stresses that exceeded the allowable as the result of excessive grinding. This joint is discussed further in Section IV.B. No other repair of these defects was required.

3) Incorrect Configuration

A. Gap in continuous weld (typcially at nail holes provided in embedded plates to aid installation) - 31 joints.

B. Spacing on intermittent welds - 1 joint

C. Overrrun (i.e. excessive weld length) - 754 joints. 658 of these joints involved overrun on the clip angle to embedded plate return welds only.

D. Weld in wrong location/not welded per drawing (e.g. bevel vs. fillet weld, etc) - 5 joints

No joints were identified with overstress conditions as a result of incorrect weld configuration. Overrun on the clip angle to embedded plate welds was the most common welding deviation identified. Although the ideal condition would be to have the return weld extend only 1 inch maximum from the toe of the angles, the extra weld length does not reduce the capacity of the beam or the embedded plate to support the design loads. No repairs were required as the result of incorrect weld configuration.

4) Underrrun (i.e. insufficient weld length)

A. Greater than 1 inch in length - 96 joints

B. Less than 1 inch in length - 233 joints

An engineering evaluation has identified only 6 joints (AC, A430, A435, A436, DD and D012) in which the maximum calcuated design stress exceeded the allowable as the results of weld underrun greater than 1 inch in length. These 6 joints are discussed further in Section IV.B. No overstress conditions resulted from weld underrun less than 1 inch in length.

5) Undercut

A. Greater than 1 inch in length - 26 joints

B. Less than 1 inch in length - 62 joints

The identified undercut was typically less than or equal to 1/16 inch in depth. No overstress conditions resulted from undercut. No repairs were required.

6) Missing Material

A. Material change-out (e.g. shims or filler plates added, plate instead of angle) - 21 joints

B. Missing Material - 20 joints

C. Missing Weld (segment) - 137 joints

An Engineering evaluation has identified 69 joints (RF, R171, R172, R810 through R869, RJ87 through RJ90, C024 and C055) in which the maximum calculated design stress exceeded the allowable as the result of missing material or welds. 60 of these joints are identical polar crane girder radial stops. These 69 joints are discussed further in Section IV. B. An additional discussion of all joints with missing material and welds is included in Section IV. C.

7) Inaccessible Joints

A. Totally inaccessible - 119 joints

B. Partially inaccessible - 166 joints

A discussion of in accessible joints is included in Section IV.D.

IV. JOINT EVALUATION

A. General

All reinspection reports were forwarded to Bechtel and the as-built condition of each joint was evaluated against the allowable stresses and loading combinations specified in the SNUPPS Civil-Structural Design Criteria, 10466-C-0.

The general acceptance criteria for weld deviations from the requirements of AWS D1.1 and Bechtel Specifications 10466-C122 and 10466-C132 was:

1) All weld deviations which resulted in a violation of the design allowable stresses specified in the SNUPPS Civil-Structural Design Criteria 10466-C-0 were unacceptable and the welds were repaired.

2) Missing welds were unacceptable regardless of the stress levels in the joint and the welds were installed unless specifically approved otherwise by the engineer. (See Section IV. C)
3) Defects (cracks, lack of fusion, undercut, etc.) which jeopardized the integrity of the joint were unacceptable and required repair. The engineer performed a case by case review of each weld inspection report in order to identify those defects which required repair.

B. Joints Which Exceed Allowable Stresses

In the as-built condition, 81 joints had calculated weld stresses which exceeded the allowables as defined by the SNUPPS Civil-Structural Design Criteria 10466-C-0. All joints with calculated stresses that exceeded the allowables had missing, (in one case as the result of excessive grinding) undersized, or underlength welds. None of the joints were determined to have incurred damage as a result of the as-built condition and previous or existing loads. None of the calculated stresses exceeded the ultimate capacity of the welds. The only required rework to these joints was the installation of the missing, undersize or underlength welds.

The joints with calculated weld stresses that exceeded the allowables are:

1) Auxiliary Building Joint AC - The top and bottom return welds between the clip angles and beam 763B8 were underlength approximately 3 inches. The maximum design reaction is 12.2 kips, while the allowable load for the as-built condition was 10.5 kips. Therefore, the allowable load was exceeded by 16 percent. The ultimate capacity of the as-built

joint was 25 kips. NCR 1SN20568CW has been dispositioned to install the missing portion of the return welds in order to restore the original design condition.

2) Auxiliary Building Joint A102 - The weld between one clip angle and beam 763B3 was undersized by 1/16 inch for the entire length. In the as-built condition, the maximum calculated design stress in the weld was 20.0 kips per square inch (ksi), while the allowable weld stress is 18.6 ksi. Therefore, the allowable stress was exceeded by 8 percent. The ultimate capacity of the weld is approximately 44 ksi. NCR 1SN20995CW has been been dispositioned to increase the weld size in order to reduce the design stress below the allowable.

3) Auxiliary Building Joint A419 - The welds between the clip angle and beam 763B7 were undersized by 1/16 inch. The return welds between the clip angles and the beam were underlength by approximately 3 1/4 inches. The maximum design reaction is 12.4 kips, while the allowable load for the as-built condition was 6.9 kips. Therefore, the allowable load was exceeded by 80 percent. The ultimate capacity of the as-built joint was 16.3 kips. NCR 1SN20995CW has been dispositioned to install the underlength weld in order to restore the original design condition.

4) Auxiliary Building Joint A430 and A435 - The return welds between the clip angle and beam 763B1 were underlength by approximately 3 1/4 inches. The maximum design reaction is 10.4 kips, while the allowable load for the as-built condition was 10.0 kips. Therefore, the allowable load was exceeded by 4 percent. The ultimate capacity of the as-built joint was 23.8 kips. NCR 1SN20995CW has been dispositioned to repair the undersized weld in order to restore the original design condition.

5) Auxiliary Building Joint A431 - The clip angle to embedded plate weld was undersized by 1/16 inch for its entire length on one clip angle. The maximum design reaction is 12.4 kips, while the allowable load for the as-built condition was 10.9 kips. Therefore, the allowable load was exceeded by 14 percent. The ultimate capacity of the as-built joint was 26 kips. NCR 1SN20995CW has been dispositioned to repair the undersized weld in order to restore the original design condition.

6) Auxiliary Building Joint A436 - The return welds between the clip angles and beam 763B8 were underlength by approximately 3 1/4 inches. The maximum design reaction is 12.4 kips, while the allowable load for the as-built condition was 10.9 kips. Therefore, the allowable load was exceeded by 14 percent. The ultimate capacity of the as-built joint was 26.0 kips. NCR 1SN20995CW has been dispositioned to repair the undersized weld in order to restore the original design condition.

7) Reactor Building Joint RA - The weld between one of the clip angles and beam 606B3 is undersized up to 3/16 inch. The maximum design reaction is 81 kips, while the allowable load for the as-built condition was 62.6 kips. Therefore, the allowable load was exceeded by 29 percent. The ultimate capacity of the as-built joint was 149 kips. NCR 1SN20567CW has been dispositioned to repair the undersized weld in order to restore the original design condition.

8) Reactor Building Joint RF - The weld between the pressurizer support beam and the top support bracket at pressurizer support Detail 4 was not installed. The welds between the beam and the bottom support bracket, and between the bottom support bracket and the embedded plate were undersized.

The bottom bracket welds must support the entire horizontal load with the beam to top support bracket weld not installed. An engineering analysis has determined that the beam to bottom bracket weld was adequate to support the maximum design load within allowable stresses, however, the bottom bracket to embedded plate weld was determined to be undersized by 9 percent. NCR 1SN20509CW has been dispositioned to install the beam to top bracket weld in order to reduce all stresses below the allowables.

9) Reactor Building Joint R039 - The weld between the clip angles and beam is undersized by 1/16 inch. The maximum design reaction is 60 kips, while the allowable load for the as-built condition was 50 kips. Therefore, the allowable load was exceeded by 20 percent. The ultimate capacity of the as-built joint was 119 kips. NCR 1SN21072 has been dispositioned to increase the weld size in order to restore the original design condition.

10) Reactor Building Joint R171 - The weld between the support beam and the top bracket was not installed at pressurizer support Detail 6 and the weld between the support beam and the bottom bracket is undersized. The total horizontal design load on the weld is 339 kips. For the as-built condition the allowable horizontal load on the joint was 251 kips. Therefore, the allowable load was exceeded by 35 percent. The ultimate capacity was approximately 375 kips. NCR 1SN20509CW has been dispositioned to install the missing beam to top bracket weld in order to reduce all stress below design allowable.

11) Reactor Building Joint R172 - The weld between the support beam and the top support bracket was not installed and the weld between the support beam and bottom support bracket was undersized at pressurizer support Detail 8. The total horizontal design load on the joint is 339 kips. For the as-built condition, the allowable horizontal load on the joint was 286 kips. Therefore, the allowable load was exceeded by 19 percent. The ultimate capacity of the weld was approximately 426 kips. NCR 1SN20509CW has been dispositioned to installed the missing beam to top bracket weld in order to reduce all stresses below design allowables.

12) Reactor Building Joints R810 through R869 - Two of the five welds between the polar crane girder radial stops and the support bracket were not installed. The maximum design reaction is 450 kips, while the allowable load for the worst case as-built condition was 307 kips. Therefore, the allowable load was exceeded by 47 percent. The ultimate capacity of the as-built joint was 456 kips. NCR 1SN21310CW has been dispositioned to install the missing welds in order to restore the original design condition.

13) Reactor Building Joints RJ87 through RJ90 - The bottom tie was not installed at intersecting beams as required by Bechtel drawing C-OS2311. A review of existing design calculations indicates that the as-built connection is adequate to support all design loads within allowable stresses. Due to the installation of electrical conduit supports the bottom tie plate cannot be installed. Drawing C-OS2311 has been revised to delete the requirements for these plate.

14) Control Building Joint C024 - The beam seat required for this joint was not installed. The maximum design load on the joint is 31.0 kips. The allowable capacity of the as-built web connection was 24.0 kips. Therefore, the allowable load was exceeded by 29 percent. The ultimate capacity of the as-built web connection was 57.0 kips. NCR 1SN21048CW has been dispositioned to installed the beam seat in order to restore the original design condition.

15) Control Building Joint C055 - The beam seat required for this joint was not installed. The maximum design load on the joint is 12.7 kips. The allowable capacity of the as-built web connection was 10.9 kips. Therefore, the allowable load was exceeded by 17 percent. The ultimate capacity of the as-built web connection was 26.0 kips. NCR 1SN21031CW has been dispositioned to installed the beam seat in order to restore the original design condition.

16) Control Building Joint C146 - The weld between one of the clip angle and the beam was ground out for a 12 inch length. The maximum design reaction is 130 kips, while the allowable load for the as-built condition was 91.5 kips. Therefore, the allowable load was exceeded by 42 percent. The ultimate capacity of the as-built joint was 218 kips. NCR 1SN20915CW has been dispositioned to replace the missing weld length in order to restore the original design condition.

17) Diesel Bulding Joint DD - The return welds between the clip angles and beam 12B5 were 1/2 inch to 1 inch long instead of the required 4 inches ± 1 inch. The maximum design reaction is 265 kips, while the allowble load for the as-built condition was 220 kips. Therefore the allowable

load was exceeded by 21 percent. The ultimate capacity of the as-built joint was 524 kips. NCR 1SN20565CW has been dispositioned to install the missing portion of the return welds in order to restore the original design condition.

18) Diesel Building Joint D012 - The return welds between the clip angles and beam 11B1 were underlength by approximately 3 1/4 inches. The maximum design reaction is 130 kips, while the allowable load for the as-built condition was 103 kips. Therefore, the allowable load was exceeded by 26 percent. The ultimate capacity of the as-built joint was 245 kips. NCR 1SN21186CW has been dispositioned to repair the undersized weld in order to restore the original design condition.

C. Joints with Missing Welds and Material

The reinspection program identified missing welds at 137 joints. 97 of these joints were associated with three specific areas of construction:

1) polar crane girder - 60 radial stops had welds missing on the support plates
2) pressurizer support beams - 6 joints had the beam to top support bracket missing
3) beam seats - 31 joints had missing seat to beam welds

An engineering evaluation has determined that none of the missing welds would have resulted in the failure of a safety related component. A discussion of each joint with missing welds follows:

1) Reactor Building Joints R810 through R869 - Two of the five welds were not installed on each of 60 polar crane girder radial stops. As

discussed in Section IV.B all of these joints would have been overstressed for the most critical design loading combination, however, none of the joints would have failed as a result of the missing welds. The applicable NCR's (see Appendix A) have been dispositioned to install the missing welds in order to restore the original design margins.

2) Reactor Building Joints RF, R169, R170, R171, R172 and R174 - The weld between the pressurizer support beams and the top support brackets were not installed on all six pressurizer support beam joints. Three of the joints (RF, R171 and R172) would have been overstressed for the most critical design loading condition (see Section III.B), however, none of the joints would have failed as the result of the missing welds. NCR 1SN20509CW has been dispositioned to install the welds in order to reduce the stresses below design allowables.

3) Auxiliary Building Joint AF - The weld between one of the support clip angles and the beam was not installed. An engineering evaluation has determined that the existing one-sided connection was adequate to support the design loads within allowable stresses. NCR 1SN20495CW has been dispositioned to install the missing weld in order to restore the original design condition.

4) Auxiliary Building Joints A012, A013, A023, A036, A039, A040, A041, A046, A058, A060, A061, A063, A064, A067, A068, A069, A070, A077, A100, A315, A320, A369, A385 and A386. Control Building Joints C022, C023, C027, C028, C029, C030, and C212 - The connection welds between the bottom flange of the beams and the beam seats were not installed. This weld is not designed to support design loads. The vertical reaction of

the beam is transfered to the beam seat through bearings between the bottom of the flange and the top of the seat. The welds simply hold the beam in the required location. In additional to the seated connection all of these joints have full web connections which prevent the beam from moving and thus there is no consequence to the omission of the beam to seat welds. The applicable NCR's (see Appendix A) have been dispositioned to install the missing welds in order to restore the original design condition.

5) Reactor Building Joint RJ83 through RJ86 - The welds between the interior framing members of the containment cooler support frames and the floor framing steel were not installed. An engineering evaluation has determined that installed welds on the exterior framing members were adequate to support the coolers without exceeding the allowable stresses. The disposition of NCR 1SN20494CW provided details for the installation of welds between the interior framing members and the floor framing in order to restore the original design margins.

6) Auxiliary Building Joints A609 through A616 - The welds between the clips angles and the support (in these cases a girder rather than an embedded plate) were not installed. The welds are provided to temporarily support the beams during removal of beams on the far side of the supporting girder. A fully bolted connection is provided to support the beams during normal operation. NCR 1SN21273CW has been dispositioned to install the missing welds.

7) Reactor Building Joint R585 - The welds between the gusset plate and the C8 beam were not installed as required by the erection drawing.

However, an alternate, unspecified weld was installed which is capable of supporting the design load within allowable stresses. NCR 1SN21235CW has been dispositioned to install the missing weld in order to restore the original design condition.

8) Reactor Building Joints R945 and R947 - The welds between the clip angles and C8 platform beams were not installed. A bolted connection was also provided between the beams and clip angles which is capable of supporting the design loads within allowable stresses. NCR 1SN21274CW has been dispositioned to install the missing welds in order to restore the original design condition.

9) Diesel Building Joints D001 and D002 - The weld between a diagonal brace gusset plate and the web of a beam was not installed. In addition to missing weld detail, there is a clip angle shop welded to the gusset plate and field bolted to the beam that is capable to of supporting the design load. The joint has been approved by NCR 1SN20865 to use-as-is without installing the gusset plate to beam weld.

10) Auxiliary Building Joints A633, A634 and A635 - The welds between the clip angles and the column were not installed. A bolted connection was also provided between the clip angles and the colump which is capable of supporting the design loads within allowable stresses. NCR's 1SN21272CW, and 1SN21399CW have been dispostioned to install the missing welds in order to restore the original design conditon.

11) Reactor Building Joints R991 and R992 - The welds between gusset plate 411PM4 and beams were not installed as required by the erection drawings. An engineering evaluation has determined that the installed welds were adequate to support the design loads without exceeding the allowable stresses. NCR 1SN21323CW has been dispositioned to install the missing welds in order to restore the original design condition.

12) Auxiliary Building Joint A111 - The weld between the toe of a C8 channel frame and the support beam below it was not installed. The existing weld between the back of the channel and the beam is adequate to support the channel without exceeding allowable stresses. NCR 1SN20798CW has been dispositioned to install the missing welds in order to restore the original design condition.

13) Fuel Building Joints F037 and F038 - The welds between the flanges of a C8 beam and embedded plate were not installed. An engineering evaluation has determined that the existing welds between the C8 web and the embedded plate is adequate to support the design loads within allowable stresses. NCR 1SN20883CW has been dispositioned to install the missing welds in order to restore the original design condition.

14) Auxiliary Building Joints A396, A412, A641 and A646
Reactor Building Joints R056 and R876
Control Building Joints C013, C014, C085 and C128
Fuel Building Joints F006, F017, F018 and F022

The clip angle to beam or clip angle to embed return welds were not installed at these joints. An engineering evaluation has determined that none of the joints would be overstressed as a result of the missing return welds. The applicable NCR's (see Appendix A) have been dispositioned to install the missing welds in order to restore the original design condition.

The reinspection identified 20 joints with missing material as described below. An engineering evaluation has determined that the missing material would not have resulted in the failure of safety equipment or building components. The joints with missing material are:

1) Auxiliary Building Joints A055 and A098, Control Building Joints C025, C036, C037, C040, C042, C052, C053, and C054 - The beam seats for these 10 connections were not installed. The beam seats were specified on applicable American Bridge erection drawings to be installed as required by Bechtel Standard Detail 10 on Drawing C-0011. A review of the design calculations indicated that the existing web connections were capable of supporting the design reactions within allowable stresses even though the beam seats were not installed. The beam seats have been installed in order to restore the original design condition.
2) Reactor Building Joint R059 - The tension plate was not installed between the embedded plate and beam 625B1. A review of the design calculations indicates that the existing web connection is adequate to support the vertical and axial loads. NCR 1SN21076CW has been dispositioned to install the plate in order to restore the original design condition.

3) Reactor Building Joints RJ93 and RJ94 - The bottom tie was not installed at intersecting beams as required by Bechtel drawing C-OS2311. A review of existing design calculations indicates that the as-built connection is adequate to support all design loads within allowable stresses. Due to the installation of electrical conduit supports the bottom tie plate cannot be installed. Drawing C-OS2311 has been revised to delete the requirements for these plate.

4) Reactor Building Joints RJ87 through RJ90 - The lateral support brackets for the incore instrumentation tube supports were not installed as required by drawing C-OS2924 Section A. An engineering analysis by Westinghouse Electric Corporation has indicated that the missing brackets could result in an overstress condition in the instrumentation tubes, however, no failure of the tubes would have resulted from the missing bracket. Westinghouse letter SNP(KG)-503 is included as an attachment of this report. NCR 1SN20494CW has been dispositioned to install the brackets in order to restore the original design condition.

5) Auxiliary Building Joint A628 - Only 1 of the 2 required clip angles was installed. An engineering evaluation has determined that the installed clip angle is adequate to support the design load within the allowable stresses. NCR 1SN21272CW has been dispositioned to install the missing clip angle in order to restore the original design condition.

6) Control Building Joints C024 and C055 - The beam seats were not installed. As discussed in Section IV.B, the maximum calculated design stress in the existing web connections would have exceeded the allowable without the beam seats installed, however, the joints would not have failed. NCR's 1SN21048CW and 1SN21031CW have been dispositioned to install the beam seats in order to restore the original design condition.

D. Inaccessible Joints

As noted in Section III.B, 119 joints were identified by the reinspection to be totally inaccessible. 59 of these joints were evaluated on a case by case basis, typically where alternate load paths existed (i.e. the beam is embedded in a concrete wall which is capable of supporting the design load in the completed structure). In addition, some portions of the welds were inaccessible on 166 joints. Sufficient information was available on 144 of these joints to enable a case by case evaluation to be performed. Therefore, a total of 82 joints, out of the total population of 2669 joints were identified in which a case by case evaluation of the acceptability of the welds could not be determined.

The fully inspected joints may be viewed as a sample of the total population of joints consisting of fully inspected, partially inspected and uninspectable joints. Based on the above numbers a statistical evaluation may be undertaken for those joints which are either totally or partially inaccessible. It is important to observe that the sample size represents such a significant percentage of the total population that the statistic associated with the sample may be applied to the total population with virtually 100 percent confidence. This implies that if some percentage of the inspected joints were determined to exceed allowable stresses, then statistically this percentage may be assumed for the total population with a very high confidence.

Of the 2587 joints which were evaluated on a case by case basis, only 81 joint, 3.13 percent, were identified in which the weld stresses exceed the allowables. Considering that 60 of these joints are polar crane radial stops installed to one typicaly detail, there are 21 joints in the remaining population of 2527 joints, or 0.8 percent, which exceed allowable stresses. We would expect the percentage of joints which exceed the allowable stresses in the group of inaccessible and unevaluated joints to be approximately 0.8 percent, or approximately 1 joint in the group of 82 joints. Likewise, we would not expect to find any joints that would fail under the design loading conditions as a result of welding deviations.

V. CONCLUSION

No significant deficiencies as defined by 10CFR50.55(e) were identified as the result of the reinspection and evaluation of AWS field welding of structural and miscellaneous steel construction at Wolf Creek. All joints with calculated stresses that exceeded the allowables as the result of welding deficiencies are being repaired as described in Section IV. B. Missing welds and materials are being installed as described in Section IV. C.

Attachment to AWS Welding Evaluation Report

SNP(KG)-503

Westinghouse
Electric Corporation

Water Reactor
Divisions

Nuclear Operations Division

Box 355
Pittsburgh Pennsylvania 15230

October 1, 1984

Mr. J. A. Bailey
Wolf Creek Site
KANSAS GAS & ELECTRIC COMPANY
P.O. Box 309
Burlington, KS 66839

SNUPPS PROJECTS
Bottom Mounted Instrumentation Supports Evaluation

Dear Mr. Bailey:

Westinghouse has evaluated the BMI guide tubing support deficiency reported by KG&E on 9-25-84 and concludes there is no potential safety concern.

The deficiency was described as the omission of four (4) 4x4x1/4 angle members from the support located 32' - 2 3/4" north of the RV centerline. The angles are shown in detail A of Bechtel drawing C-0S2924 Rev. 4 and are labeled "by owner".

The worst case faulted condition stresses with this support deficiency reach 36.6 KSI at the socket joint between the BMI tubing and the instrumentation nozzles in the bottom head of the RV. This stress exceeds the faulted condition allowable of 34 KSI. The stress, however, is based on a conservative stress intensification factor (S.I.F.) of 2.1 as required by the applicable ASME Code. The Summer 1983 Code Addenda provides relaxation of the S.I.F., depending on the actual joint geometry, in Figure NC-3673.2(b)-1. For the applicable geometry, the S.I.F. is such that the stress in question reduces to 29 KSI, and is thus within code limits. Westinghouse has also determined that there is no safety impact on the instrumentation nozzle or its attachment to the Reactor Vessel.

Therefore, Westinghouse does not view the above described support deficiency as a potential safety concern. We do recommend, though, and have been advised by KG&E that the support be brought into conformance with the Bechtel design.

Very truly yours,

John W. Irons
J. W. Irons, Project Engineer
SNUPPS Projects

John W. Irons
L. R. Benson, Manager
SNUPPS Projects

WESTINGHOUSE
NOD
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JWI/rcc/1011d

cc: J. A. Bailey 1L
N. Goel 1L

TABLE 1

MISCELLANEOUS/STRUCTURAL STEEL CONNECTION SUMMARY

Building	Shop Welded Joints		Field Bolted Joints		Field Welded Joints		Total Joints	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Auxiliary	1500	41%	1580	54%	610	16%	3690	100%
Reactor	2680	51%	1520	29%	1060	20%	5260	100%
Control	350	35%	380	39%	260	26%	990	100%
Diesel	260	40%	310	48%	80	12%	650	100%
Fuel	90	19%	110	23%	280	58%	480	100%
Pumphouse	20	24%	30	38%	30	38%	80	100%
TOTAL	4900	44%	3930	35%	2320	21%	11150	100%

TABLE 2
STATUS OF AWS WELDING INSPECTIONS AND ENGINEERING EVALUATIONS

BUILDING	TOTAL JOINTS	JOINTS INSPECTED(1)	JOINTS EVALUATED(1)	JOINTS REQUIRING REWORK (2)	ADDITIONAL JOINTS TO BE REWORKED (3)	SIGNIFICANTLY DEFICIENT JOINTS (10CFR50.55 (e))
AUXILIARY	693	693	693	7	42	0
REACTOR	1300	1300	1300	69	15	0
CONTROL	265	265	265	3	18	0
DIESEL GENERATOR	98	98	98	2	2	0
FUEL	277	277	277	0	6	0
ESWS PUMPHOUSE	36	36	36	0	0	0
TOTAL	2669	2669	2669	81	83	0

(1) TOTAL INCLUDES INACCESSIBLE JOINTS

(2) DESIGN ALLOWABLE STRESSES ARE EXCEEDED IN THE AS-BUILT CONDITION

(3) DESIGN ALLOWABLE STRESSES ARE NOT EXCEEDED IN THE AS-BUILT CONDTION. THESE JOINTS ARE BEING REWORKED PER KG&E MANAGEMENT DIRECTION TO INSTALL MISSING AND UNDERLENGTH WELDS.

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.DATE 27 DEC 84  17:31:23  RID      1    01 DEC 84  BECHTEL
.                                                                   E004530
*                            STRUCTURAL JOINTS TRACKING                                   AWS WELDING REPORT, APPENDIX A, PAGE  1 of 56
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  A002   C-0S1411  C-121-00165  E205   2026-00  1-0 N OF A14     10-8 W OF AL      21022   VOID                            SAME AS JOINT AB
  A003   C-0S1411  C-121-00165  E205   2026-00  1-0 N OF A14     2-6 E OF CA       21022   A038/A039
  A004   C-0S1411  C-121-00165  E205   2026-00  A12              1-0 E OF CA       21022   A040/A041
  A005   C-0S1411  C-121-00165  E205   2026-00  A10              1-0 E OF CA       21022   A042/A043/A044
  A006   C-0S1421  C-121-00971  E105   2026-00  A7               1-0 E OF CA       21043   A237/A238/A239
  A007   C-0S1421  C-121-00971  E105   2026-00  A6               1-0 E OF CA       21043   A240/A241/A242/A243
  A008   C-0S1421  C-121-00971  E105   2026-00  A4               1-0 E OF CA       21043   A244/A245/A246
  A009   C-0S1421  C-121-00971  E105   2026-00  A3               1-0 E OF CA       21043   A247/A248/A249
  A010   C-0S1421  C-121-00971  E105   2026-00  1-0 S OF A1      AM                21043   A250/A152
  A011   C-0S1321  C-121-00034  E103   2000-00  A7               1-0 E OF CA       20962   A203/A204/A205/A206
  A012   C-0S1311  C-121-00130  E203   2000-00  A8               1-0 E OF CA       20798   A160/A161/A162/A163
  A013   C-0S1311  C-121-00130  E203   2000-00  A12              1-0 E OF CA       20798   A164/A165/A166
  A014   C-0S1311  C-121-00130  E203   2000-00  2-0 N OF A14     7-6 E OF AN       20965   A167/A168
  A015   C-0S1311  C-121-00130  E203   2000-00  2-0 N OF A14     7-10 W OF AL      20965   A169/A170/A171
  A016   C-0S1352  C-121-01549  E302   2000-00  3-0 S OF A3      1-0 W OF AA       21047   A068
  A017   C-0S1352  C-121-01549  E302   2000-00  4-6 S OF A2.6    1-0 W OF AA       21050   A069
  A018   C-0S1352  C-121-01549  E302   2000-00  A2               1-0 E OF AC       21047   A070
  A019   C-0S1352  C-121-01549  E302   2000-00  2-0 S OF A1      AD                21050   A071
  A020   C-0S1352  C-121-01549  E302   2000-00  2-0 S OF A1      2-6 E OF AC       21050   A072
  A021   C-0S1352  C-121-01549  E302   2000-00  2-0 S OF A1      AB                21050   A073
  A022   C-0S1321  C-121-00034  E103   2000-00  A6               1-0 E OF CA       20962   A207/A208/A209/A745
  A023   C-0S1321  C-121-00034  E103   2000-00  A5               1-0 E OF CA       20962   A210/A211/A212/A213
  A024   C-0S1321  C-121-00034  E103   2000-00  A3               1-0 E OF CA       20962   A214/A215/A216/A796
  A025   C-0S1321  C-121-00034  E103   2000-00  A2               1-0 E OF CA       20962   A217/A218/A219
  A026   C-0S1321  C-121-00034  E103   2000-00  2-0 S OF A1      5-4 E OF CA       20960   A220/A370/A371/A372
  A027   C-0S1531  C-121-00629  E502   2047-06  1-0 N OF A13.1   11-2 E OF AF6     21029   A066
  A028   C-0S1531  C-121-00629  E502   2047-06  1-0 N OF A14     AH3               21022   A686
  A029   C-0S1521  C-121-00912  E401   2047-06  A5               1-0 E OF CA       21027   A175/A176/A177
  A030   C-0S1521  C-121-00912  E401   2047-06  A4               1-0 E OF CA       21027   A178/A179/A180
  A031   C-0S1521  C-121-00912  E401   2047-06  A3               1-0 E OF CA       21027   A181/A182//A183/A184
  A032   C-0S1521  C-121-00912  E401   2047-06  A2               1-0 E OF CA       21027   A185/A186
  A033   C-0S1521  C-121-00912  E401   2047-06  1-0 S OF A1      AN                21027   A187/A188/A189
  A034   C-0S1521  C-121-00712  E401   2047-06  1-0 S OF A1      10-0 E OF AN      21027   A190/A191/A192
  A035   C-0S1521  C-121-00912  E401   2047-06  1-0 S OF A1      AM                21027   A193/A194/A195/196
  A036   C-0S1521  C-121-00912  E401   2047-06  1-0 S OF A1      10-0 E OF AM      20798   A197/A198/A199
  A037   C-0S1521  C-121-00912  E401   2047-06  1-0 S OF A1      AK                21028   VOID                            SAME AS JOINT AF
  A038   C-0S1541  C-121-00627  E402   2047-06  1-0 S OF A1      AJ                20964   A044/A045/A046
  A039   C-0S1541  C-121-00627  E402   2047-06  1-0 S OF A1      11-6 W OF AH      20798   A048/A049/A050
  A040   C-0S1541  C-121-00627  E402   2047-06  1-0 S OF A1      AH                20798   A051/A052/A053
  A041   C-0S1541  C-121-00627  E402   2047-06  1-0 S OF A1      8-6 W OF AF       20798   A054/A055/A056
  A042   C-0S1541  C-121-00627  E402   2047-06  A3               1-0 W OF AE       20764   A057/A058/A059
  A043   C-0S1541  C-121-00627  E402   2047-06  1-7 N OF A3.3    1-0 W OF AE       20964   A060/A061/A062
  A044   C-0S1352  C-121-01549  E302   2000-00  3-0 S OF A3      1-0 E OF AE       21050   A074
  A045   C-0S1352  C-121-01549  E302   2000-00  3-6 N OF A3      1-0 E OF AE       21049   A075/A076
  A046   C-0S1311  C-121-00130  E203   2000-00  A10              1-0 E OF CA       20798   A172/A173/A174
  A047   C-0S1411  C-121-00165  E205   2026-00  A8               1-0 E OF CA       21022   A063/A064/A065
  A048   C-0S1421  C-121-00971  E105   2026-00  A2               1-0 E OF CA       21043   A252/A253
  A049   C-0S1421  C-121-00971  E105   2026-00  A5               1-0 E OF CA       21043   A254/A255/A256/A257
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  A051   C-0S1421  C-121-00971  E105   2026-00  1-0 S OF A1      AK               21043   A260/A261/A262/A263
  A052   C-0S1321  C-121-00034  E103   2000-00  2-0 S OF A1      AN               20962   A221/A222/A223
  A053   C-0S1321  C-121-00034  E103   2000-00  2-0 S OF A1      AM               20962   A224/A225/A226/A227
  A054   C-0S1321  C-121-00034  E103   2000-00  2-0 S OF A1      AK               20962   A228/A229/A230/A735
  A055   C-0S1352  C-121-01549  E302   2000-00  A2               1-0 W OF AC      20798   A077/A078/A079
  A056   C-0S1352  C-121-01549  E302   2000-00  A2.6             1-0 E OF AE      21049   A080/A081
  A057   C-0S1352  C-121-01549  E302   2000-00  A2               1-0 E OF AE      21049   A082/A083
  A058   C-0S1541  C-121-00627  E402   2047-06  1-0 S OF A1      AF               21314   A016/A017
  A058A  C-0S1231  C-121-00976  E202   1988-00  2-0 N OF A14     2-10 E OF AH2    20798   A704/A705/A706
  A059   C-0S1231  C-121-00976  E202   1988-00  2-0 N OF A14     5-6 E OF AH3     21067   A018
  A060   C-0S1231  C-121-00976  E202   1988-00  2-0 N OF A14     AH3              20798   A013/A014/A015
  A061   C-0S1231  C-121-00976  E202   1988-00  2-0 N OF A14     5-0 E OF AJ      20798   A009/A010/A011/A012
  A062   C-0C1532                      2047-06  7-4 S OF A10.9   AF6              ------  N/A                        FAD REQUEST 717
  A063   C-0S1331  C-121-01635  E204   2000-00  2-0 N OF A14     AJ               20798   A129/A130/A131
  A064   C-0S1331  C-121-01635  E204   2000-00  2-0 N OF A14     AH3              20798   A132/A133/A134/A135
  A065   C-0S1331  C-121-01635  E204   2000-00  2-7 S OF A13.1   2-0 W OF AG      21030   A136/A137/A138/A139
  A066   C-0S1331  C-121-01635  E204   2000-00  2-0 N OF A13.1   AG               21352   A687
  A067   C-0S1331  C-121-01635  E204   2000-00  2-0 N OF A13.1   AF6              20798   A140/A141/A142
  A068   C-0S1331  C-121-01635  E204   2000-00  2-0 N OF A13.1   10-9 E OF AF6    20798   A143/A144/A145/A146
  A069   C-0S1331  C-121-01635  E204   2000-00  2-0 N OF A13.1   3-6 W OF AD1     20798   A147/A148/A149/A150
  A070   C-0S1331  C-121-01635  E204   2000-00  A11.8            2-0 W OF AD1     20798   A151/A152/A153/A154
  A071   C-0S1341  C-121-01634  E104   2000-00  2-0 S OF A1      AJ               20961   A264/A265/A266/A267
  A072   C-0S1341  C-121-01634  E104   2000-00  2-0 S OF A1      11-6 E OF AJ     20961   A268/A269/A270/A271
  A073   C-0S1341  C-121-01634  E104   2000-00  2-0 S OF A1      AH               20961   A272/A273/A274/A275
  A074   C-0S1341  C-121-01634  E104   2000-00  2-0 S OF A1      8-6 E OF AH      20761   A276/A277/A278/A279
  A075   C-0S1341  C-121-01634  E104   2000-00  2-0 S OF A1      AF               20961   A280/A281/A282
  A076   C-0S1341  C-121-01634  E104   2000-00  11-0 S OF A2     1-0 W OF AE      20761   A283/A284
  A077   C-0S1341  C-121-01634  E104   2000-00  3-1 S OF A3      1-0 W OF AE      20798   1005/A286/A287/A288
  A078   C-0S1352  C-121-01685  E301   1989-00  3-6 N OF A3      1-0 E OF AE      21055   A019/A067
  A079   C-0S1352  C-121-01685  E301   1989-00  5-0 N OF A26     1-0 E OF AE      21055   A020
  A080   C-0S1352  C-121-01685  E301   1989-00  5-0 S OF A2      1-0 E OF AE      21055   A021
  A081   C-0S1352  C-121-01685  E301   1989-00  2-0 S OF A1      AD               21055   A022
  A082   C-0S1352  C-121-01685  E301   1989-00  0-6 N OF A3      1-0 E OF AC      21055   A023
  A083   C-0S1352  C-121-01685  E301   1989-00  3-6 N OF A3      1-0 E OF AC      21055   A024
  A084   C-0S1352  C-121-01685  E301   1989-00  A26              1-0 E OF AC      21055   A025
  A085   C-0S1352  C-121-01685  E301   1989-00  5-0 N OF A26     1-0 E OF AC      21055   A026
  A086   C-0S1352  C-121-01685  E301   1989-00  5-7 N OF A2      1-0 E OF AC      21055   A027
  A087   C-0S1352  C-121-01685  E301   1989-00  2-0 S OF A1      AB               21055   A028
  A088   C-0S1352  C-121-01685  E301   1989-00  3-0 S OF A3      1-0 W OF AA      21055   A029
  A089   C-0S1352  C-121-01685  E301   1989-00  A26              1-0 W OF AA      21055   A030
  A090   C-0S1352  C-121-01685  E301   1989-00  5-0 N OF A26     1-0 W OF AA      21055   A031
  A091   C-0S1352  C-121-01685  E301   1989-00  5-0 S OF A2      1-0 W OF AA      21055   A032
  A092   C-0S1352  C-121-01685  E301   1989-00  5-7 N OF A2      1-0 W OF AA      21055   A033
  A093   C-0S1352  C-121-01549  E302   2000-00  A2.6             1-0 W OF AC      21049   A084/A085
  A094   C-0S1352  C-121-01549  E302   2000-00  A2.6             1-0 E OF AC      21050   A036
  A095   C-0S1352  C-121-01549  E302   2000-00  2-0 S OF A1      3-0 W OF AC      21050   A087
  A096   C-0S1352  C-121-01549  E302   2000-00  2-0 S OF A1      3-7 W OF AA      21049   A088
  A097   C-0S1352  C-121-01549  E302   2013-06  A3               1-0 E OF AC      21049   A089/A090
  A098   C-0S1431  C-121-00617  E206   2026-00  1-0 N OF A13.1   2-6 W OF AD1     20798   A233/A234/A235/A236
  A099   C-0S1441  C-121-01700  E106   2026-00  2-0 N OF A3.3    1-0 W OF AE      20963   A304/A850
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  A100   C-0S1441  C-121-01700  E106    2026-00   A3                  1-0 W OF AE       20798   A305/A306/A307
  A101   C-0S1452  C-121-10675  E702    2037-06   2-3 S OF A2.6       1-0 E OF AE       20995   A303/A309
  A102   C-0S1452  C-121-10675  E702    2037-06   2-3 S OF A2.6       1-0 W OF AC       20995   A310/A311
  A103   C-0S1452  C-121-10675  E702    2037-06   2-3 S OF A2.6       1-0 E OF AC       20995   A312/A313
  A104   C-0S1452  C-121-10675  E702    2041-10   8-5 N OF A2.6       1-0 E OF AC       20995   A314/A315
  A105   C-0S1452  C-121-10675  E702    2041-10   A2                  1-0 E OF AC       20995   A316/A317
  A106   C-0S1452  C-121-10675  E702    2037-06   2-3 S OF A2.6       1-0 W OF AA       20995   A318/A726
  A107   C-0S1452  C-121-10675  E702    2041-10   8-7 S OF A2         1-0 W OF AA       20995   A319/A797
  A108   C-0S1452  C-121-10675  E702    2041-10   A2                  1-0 W OF AA       -----   N/A
  A109   C-0S1521  C-121-00912  E401    2047-06   A6.3                1-0 E OF CA       21027   A55/A156
  A110   C-0S1521  C-121-00912  E401    2047-06   1-0 S OF A1         2-6 E OF CA       21027   A157/A158/A159
  A111   C-0S1241  C-121-00007  E801    1988-00   1-0 S OF A2         1-0 W OF AF       20798   A201/A202
  A112   C-0S1941  C-121-00627  E402    2047-06   1-0 S OF A1         7-0 W OF AJ       20964   A367/A368
  A113   C-0S1621  C-121-00274  E403    2073-02   A2                  1-0 E OF CA       20935   A231/A232
  A114   C-0S1352  C-121-01561  FW815   2013-06   0-6 N OF A2.6       4-4 W OF AC       20975   A289/A290
  A115   C-0S1352  C-121-01561  FW815   2013-06   0-6 S OF A2         4-4 W OF AC       20975   A291/A292
  A116   C-0S1352  C-121-01683  E809    2026-00   3-0 S OF A3         1-0 E OF AE       20973   A293
  A117   C-0S1352  C-121-01683  E809    2026-00   A2                  1-0 E OF AE       21352   A681
  A118   C-0S1352  C-121-01683  E809    2026-00   A3                  1-0 W OF AC       20972   A294
  A119   C-0S1352  C-121-01683  E809    2026-00   A2.6                1-0 W OF AC       21352   A682
  A120   C-0S1352  C-121-01683  E809    2026-00   2-0 S OF A1         AD                20972   A295/A296
  A121   C-0S1352  C-121-01683  E809    2026-00   A3                  1-0 E OF AC       20972   A297
  A122   C-0S1352  C-121-01683  E809    2026-00   A2.6                1-0 E OF AC       21352   A683
  A123   C-0S1352  C-121-01683  E809    2026-00   A2                  1-0 E OF AC       20772   A298/A849
  A124   C-0S1352  C-121-01683  E809    2026-00   2-0 S OF A1         6-0 W OF AB       20972   A299/A300
  A125   C-0S1352  C-121-01683  E809    2026-00   2-0 S OF A1         6-0 E OF AB       20772   A301
  A126   C-0S1352  C-121-01683  E809    2026-00   3-0 S OF A3         1-0 W OF AA       20972   A302
  A127   C-0S1352  C-121-01683  E809    2026-00   A2.6                1-0 W OF AA       21352   A634
  A128   C-0S1352  C-121-01683  E809    2026-00   A2                  1-0 W OF AA       20973   A303
  A129   C-0S1212  C-121-01739  E210    1989-08   2-0 N OF A14        AN                -----   N/A
  A130   C-0S1212  C-121-01789  E210    1989-08   8-0 S OF A10        1-0 E OF CA       -----   N/A
  A131   C-0S1212  C-121-01789  E210    1989-08   A9                  1-0 E OF CA       -----   N/A
  A132   C-0S1212  C-121-01789  E210    1989-08   A8                  1-0 E OF CA       20980   A103
  A133   C-0S1212  C-121-01789  E210    1989-08   10-0 N OF A8        1-0 E OF CA       -----   N/A
  A134   C-0S1222  C-121-00127  E111    1989-08   A7                  1-0 E OF CA       -----   N/A
  A135   C-0S1212  C-121-01789  E210    1989-08   8-0 N OF A12        1-0 W OF AN       -----   N/A
  A136   C-0S1212  C-121-01789  E210    1989-08   A9                  1-0 W OF AN       21132   A543
  A137   C-0S1212  C-121-01789  E210    1989-08   7-6 N OF A7         1-0 W OF AN       -----   N/A
  A138   C-0S1212  C-121-01789  E210    1989-08   A8                  1-0 W OF AN       21132   A544
  A139   C-0S1222  C-121-00127  E111    1989-08   A7                  1-0 W OF AN       21132   A545
  A140   C-0S1212  C-121-01789  E210    1989-08   1-0 S OF A12        5-5 E OF AN       -----   N/A
  A141   C-0S1212  C-121-01789  E210    1989-08   1-0 S OF A12        10-10 E OF AN     20980   A104/A105
  A142   C-0S1212  C-121-01789  E210    1989-08   1-0 S OF A12        7-0 W OF AL       20987   A106
  A143   C-0S1212  C-121-01789  E210    1989-08   9-0 N OF A14        1-6 W OF AL       -----   N/A
  A144   C-0S1212  C-121-01789  E210    2015-00   A12                 1-0 E OF CA       20980   A107/A108
  A145   C-0S1212  C-121-01789  E210    2015-00   A11                 1-0 E OF CA       20980   A109/A110
  A146   C-0S1212  C-121-01789  E210    2015-00   8-0 N OF A11        1-0 E OF CA       20980   A111/A112
  A147   C-0S1212  C-121-01789  E210    2015-00   A10                 1-0 E OF CA       20980   A113/A114
  A148   C-0S1212  C-121-01789  E210    2015-00   9-0 N OF A10        1-0 E OF CA       20980   A115/A116
  A149   C-0S1212  C-121-01789  E210    2015-00   A9                  1-0 E OF CA       20980   A117
  A150   C-0S1212  C-121-01789  E210    2015-00   A8                  1-0 E OF CA       -----   N/A
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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A151	C-0S1212	C-121-01789	E210	2015-00	10-0 N OF A8	1-0 E OF CA	-----	N/A
A152	C-0S1212	C-121-01871	E110	2015-00	A7	1-0 E OF CA	-----	N/A
A153	C-0S1212	C-121-01789	E210	2015-00	A12	1-0 W OF AN	20980	A118/A119
A154	C-0S1212	C-121-01789	E210	2015-00	A3	1-0 W OF AN	-----	N/A
A155	C-0S1212	C-121-01789	E210	2015-00	10-0 N OF A8	1-0 W OF AN	-----	N/A
A156	C-0S1212	C-121-01871	E110	2015-00	A7	1-0 W OF AN	-----	N/A
A157	C-0S1212	C-121-01776	FW825	1989-08	2-0 N OF A14	6-9 E OF AN	20974	A091
A158	C-0S1222	C-121-00127	E111	1989-08	10-0 N OF A7	1-0 E OF CA	20978	A320/A321
A159	C-0S1222	C-121-00127	E111	1989-08	A6	1-0 E OF CA	20978	A322/A323
A160	C-0S1222	C-121-00127	E111	1989-08	9-0 N OF A6	1-0 E OF CA	20978	A324
A161	C-0S1222	C-121-00127	E111	1989-08	A5	1-0 E OF CA	-----	N/A
A162	C-0S1222	C-121-00127	E111	1989-08	8-3 N OF A5	1-0 E OF CA	20978	A326/A327/A344
A163	C-0S1222	C-121-00127	E111	1989-08	5-6 N OF A4	1-0 E OF CA	20978	A328
A164	C-0S1222	C-121-00127	E111	1989-08	8-0 S OF A3	1-0 E OF CA	-----	N/A
A165	C-0S1222	C-121-00127	E111	1989-08	A3	1-0 E OF CA	20978	A329
A166	C-0S1222	C-121-00127	E111	1989-08	7-8 N OF A3	1-0 E OF CA	-----	N/A
A167	C-0S1222	C-121-00127	E111	1989-08	7-8 S OF A2	1-0 E OF CA	-----	N/A
A168	C-0S1222	C-121-00127	E111	1989-08	A2	1-0 E OF CA	20978	A330
A169	C-0S1222	C-121-00127	E111	1989-08	10-0 N OF A7	1-0 W OF AN	20977	A331
A170	C-0S1222	C-121-00127	E111	1989-08	9-0 N OF A6	1-0 W OF AN	20977	A332
A171	C-0S1222	C-121-00127	E111	1989-08	A5	1-0 W OF AN	20977	A333
A172	C-0S1222	C-121-00127	E111	1989-08	A4	1-0 W OF AN	20978	A334/A512
A173	C-0S1222	C-121-00127	E111	1989-08	5-6 N OF A4	1-0 W OF AN	20977	A335
A174	C-0S1222	C-121-00127	E111	1989-08	8-0 S OF A3	1-0 W OF AN	20977	A336
A175	C-0S1222	C-121-00127	E111	1989-08	A3	1-0 W OF AN	20977	A337
A176	C-0S1222	C-121-00127	E111	1989-08	7-3 N OF A3	1-0 W OF AN	20977	A338
A177	C-0S1222	C-121-00127	E111	1989-08	7-8 S OF A2	1-0 W OF AN	20977	A339
A178	C-0S1222	C-121-00127	E111	1989-08	A2	1-0 W OF AN	20978	A340
A179	C-0S1222	C-121-00127	E111	1989-08	2-0 S OF A1	7-3 E OF CA	-----	N/A
A180	C-0S1222	C-121-00127	E111	1989-08	1-0 N OF A2	AN	20977	A341
A181	C-0S1222	C-121-00127	E111	1989-08	1-0 N OF A2	AK	20977	A342
A182	C-0S1222	C-121-00127	E111	1989-08	2-0 S OF A1	AN	-----	N/A
A183	C-0S1222	C-121-00127	E111	1989-08	2-0 S OF A1	10-0 E OF AN	20978	A343
A184	C-0S1222	C-121-00127	E111	1989-08	2-0 S OF A1	10-0 E OF AM	-----	N/A
A185	C-0S1242	C-121-00980	E211	2016-02	1-6 N OF A12	2-0 E OF AK	20976	A092
A186	C-0S1242	C-121-00128	E112	2015-00	1-0 S OF A1	7-0 E OF AK	-----	N/A
A187	C-0S1242	C-121-00128	E112	2015-00	1-0 S OF A1	AJ	-----	N/A
A188	C-0S1242	C-121-00128	E112	2015-00	1-0 S OF A1	10-0 E OF AJ	-----	N/A
A189	C-0S1242	C-121-00128	E112	2015-00	1-0 S OF A1	3-0 W OF AH	-----	N/A
A190	C-0S1242	C-121-00128	E112	2015-00	1-0 S OF A1	7-0 E OF AH	-----	N/A
A191	C-0S1242	C-121-00128	E112	1989-08	10-6 N OF A3	1-0 E OF AK	21180	A093/A094
A192	C-0S1242	C-121-00128	E112	1989-08	2-0 S OF A1	7-0 E OF AK	21180	A095/A096/A098
A193	C-0S1242	C-121-00128	E112	1989-08	2-0 S OF A1	AJ	21180	A097
A194	C-0S1242	C-121-00128	E112	1989-08	2-0 S OF A1	7-8 E OF AJ	21180	A099/A100
A195	C-0S1242	C-121-00128	E112	1989-08	2-0 S OF A1	7-8 W OF AH	21180	A101/A102
A196	C-0S1211	C-121-00973	E201	1988-00	2-0 N OF A14	AL	21399	INACCESSIBLE
A197	C-0S1312	C-121-01871	E110	2015-00	10-0 N OF A7	1-0 E OF CA	-----	N/A
A198	C-0S1312	C-121-01871	E110	2015-00	A6	1-0 E OF CA	21051	A369
A199	C-0S1312	C-121-01871	E110	2015-00	9-0 N OF A6	1-0 E OF CA	21143	A841
A200	C-0S1312	C-121-01871	E110	2015-00	1-5 S OF A5	1-0 E OF CA	21051	A365/A366
A201	C-0S1312	C-121-01871	E110	2015-00	7-0 N OF A5	1-0 E OF CA	-----	N/A

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A202	C-0S1312	C-121-01871	E110	2015-00	A4	1-0 E OF CA	-----	N/A
A203	C-0S1312	C-121-01871	E110	2015-00	7-6 N OF A4	1-0 E OF CA	21051	A121/A122
A204	C-0S1312	C-121-01871	E110	2015-00	8-6 S OF A3	1-0 E OF CA	-----	N/A
A205	C-0S1312	C-121-01871	E110	2015-00	A3	1-0 E OF CA	-----	N/A
A206	C-0S1312	C-121-01871	E110	2015-00	9-0 N OF A3	1-0 E OF CA	-----	N/A
A207	C-0S1312	C-121-01871	E110	2015-00	7-0 S OF A2	1-0 E OF CA	21051	A123
A208	C-0S1312	C-121-01871	E110	2015-00	A2	1-0 E OF CA	21051	A124
A209	C-0S1312	C-121-01871	E110	2015-00	1-0 S OF A1	7-9 E OF CA	-----	N/A
A210	C-0S1312	C-121-01871	E110	2015-00	1-0 S OF A1	AN	-----	N/A
A211	C-0S1312	C-121-01871	E110	2015-00	1-0 S OF A1	10-0 E OF AN	21051	A125/A126
A212	C-0S1312	C-121-01871	E110	2015-00	1-0 S OF A1	AM	-----	N/A
A213	C-0S1312	C-121-01871	E110	2015-00	1-0 S OF A1	10-0 E OF AM	21051	A127
A214	C-0S1312	C-121-01871	E110	2015-00	1-0 S OF A1	AK	21051	A128
A215	C-0S1312	C-121-01871	E110	2015-00	1-0 N OF A2	AK	21051	A393/A492
A216	C-0S1312	C-121-01871	E110	2015-00	1-0 N OF A2	10-0 W OF AK	21051	A394/A395
A217	C-0S1312	C-121-01871	E110	2015-00	1-0 N OF A2	AM	21051	A396/A491
A218	C-0S1312	C-121-01871	E110	2015-00	1-0 N OF A2	10-0 W OF AM	21051	A397/A398
A219	C-0S1312	C-121-01871	E110	2015-00	1-0 N OF A2	AN	21051	A399/A400
A220	C-0S1312	C-121-01871	E110	2015-00	A2	1-0 W OF AN	21051	A401/A490
A221	C-0S1312	C-121-01871	E110	2015-00	7-0 S OF A2	1-0 W OF AN	21051	A402
A222	C-0S1312	C-121-01871	E110	2015-00	9-0 N OF A3	1-0 W OF AN	21051	A403/A404
A223	C-0S1312	C-121-01871	E110	2015-00	A3	1-0 W OF AN	21051	A405/A487
A224	C-0S1312	C-121-01871	E110	2015-00	8-6 S OF A3	1-0 W OF AN	21051	A406
A225	C-0S1312	C-121-01871	E110	2015-00	7-6 N OF A4	1-0 W OF AN	21051	A407/A408
A226	C-0S1312	C-121-01871	E110	2015-00	A4	1-0 W OF AN	21051	A409/A488
A227	C-0S1312	C-121-01871	E110	2015-00	7-0 N OF A5	1-0 W OF AN	21051	A410/A411
A228	C-0S1312	C-121-01871	E110	2015-00	1-5 S OF A5	1-0 W OF AN	21051	A412/A413
A229	C-0S1312	C-121-01871	E110	2015-00	9-0 N OF A6	1-0 W OF AN	21051	A414/A415
A230	C-0S1312	C-121-01871	E110	2015-00	A6	1-0 W OF AN	21051	A416/A487
A231	C-0S1312	C-121-01871	E110	2015-00	10-0 S OF A6	1-0 W OF AN	21051	A417/A418
A232	C-0S1211	C-121-00973	E201	1988-00	2-0 N OF A14	6-8 W OF AK	21470	INACCESSIBLE
A233	C-0S1212	C-121-01789	E210	1989-08	7-0 S OF A12	1-0 E OF CA	20980	A421/A422
A234	C-0S1212	C-121-01789	E210	1989-08	A12	1-0 E OF CA	20980	A419/A420
A235	C-0S1212	C-121-01789	E210	1989-08	A12	1-0 W OF AN	20980	A423
A236	C-0S1212	C-121-01789	E210	1989-08	8-0 N OF A12	1-0 E OF CA	20980	A424/A425
A237	C-0S1212	C-121-01789	E210	1989-08	8-0 S OF A10	1-0 W OF AN	20979	A426
A238	C-0S1212	C-121-01789	E210	1989-08	A10	1-0 E OF CA	20980	A427
A239	C-0S1212	C-121-01789	E210	1989-08	A10	1-0 W OF AN	-----	N/A
A240	C-0S1212	C-121-01789	E210	1989-08	9-0 N OF A10	1-0 E OF CA	-----	N/A
A241	C-0S1212	C-121-01789	E210	1989-08	9-0 N OF A10	1-0 W OF AN	20979	A428
A242	C-0S1212	C-121-01789	E210	1989-08	7-6 N OF A9	1-0 E OF CA	20980	A429
A243	C-0S1212	C-121-01789	E210	1989-08	10-0 N OF A8	1-0 W OF AN	20980	A430/A431
A244	C-0S1212	C-121-01789	E210	1989-08	1-0 S OF A12	AN	-----	N/A
A245	C-0S1212	C-121-01789	E210	2015-00	A13	1-0 E OF CA	20980	A432
A246	C-0S1212	C-121-01789	E210	2015-00	A13	1-0 W OF AN	20980	A433/A434
A247	C-0S1212	C-121-01789	E210	2015-00	A11	1-0 W OF AN	20980	A435/A436
A248	C-0S1212	C-121-01789	E210	2015-00	8-0 N OF A11	1-0 W OF AN	20980	A437/A438
A249	C-0S1212	C-121-01789	E210	2015-00	A10	1-0 W OF AN	20980	A439/A440
A250	C-0S1212	C-121-01789	E210	2015-00	9-0 N OF A10	1-0 W OF AN	20980	A441/A442
A251	C-0S1212	C-121-01789	E210	2015-00	A9	1-0 W OF AN	20980	A443/A444
A252	C-0S1212	C-121-01789	E210	2015-00	1-0 N OF A9	4-4 E OF AN	20980	A445/A446

E004530

STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A253	C-0S1212	C-121-01789	E210	2015-00	1-0 N OF A9	9-7 W OF AL	20980	A447/A448
A254	C-0S1212	C-121-01789	E210	2015-00	1-0 N OF A9	AL	20980	A449
A255	C-0S1212	C-121-01789	E210	2015-00	2-0 S OF A8	AL	20980	A450/A451
A256	C-0S1212	C-121-01789	E210	2015-00	2-0 S OF A8	9-7 W OF AL	20980	A452/A453
A257	C-0S1212	C-121-01789	E210	2015-00	2-0 S OF A8	4-4 E OF AN	20980	A453/A455
A258	C-0S1212	C-121-01789	E210	2015-00	7-0 N OF A9	1-0 E OF CA	20980	A456/A457
A259	C-0S1352	C-121-01685	E301	1989-00	3-0 S OF A3	1-0 E OF AE	21055	A345/A529
A260	C-0S1352	C-121-01685	E301	1989-00	A2.6	1-0 E OF AE	21055	A346
A261	C-0S1352	C-121-01685	E301	1989-00	A2	1-0 E OF AE	21055	A347/A844
A262	C-0S1352	C-121-01685	E301	1989-00	5-7 N OF A2	1-0 E OF AE	21055	A348/A845
A263	C-0S1352	C-121-01685	E301	1989-00	3-6 S OF A1	1-0 E OF AE	21055	A349
A264	C-0S1352	C-121-01685	E301	1989-00	0-6 N OF A3	1-0 W OF AC	21055	A350/A846
A265	C-0S1352	C-121-01685	E301	1989-00	3-6 N OF A3	1-0 W OF AC	21055	A351/A847
A266	C-0S1352	C-121-01685	E301	1989-00	A2.6	1-0 W OF AC	21055	A352
A267	C-0S1352	C-121-01685	E301	1989-00	5-0 N OF A26	1-0 W OF AC	21055	A353
A268	C-0S1352	C-121-01685	E301	1989-00	5-0 S OF A2	1-0 W OF AC	21055	A354
A269	C-0S1352	C-121-01685	E301	1989-00	A2	1-0 W OF AC	21055	A355/A848
A270	C-0S1352	C-121-01685	E301	1989-00	5-7 N OF A2	1-0 W OF AC	21054	A363/A364
A271	C-0S1352	C-121-01685	E301	1989-00	3-6 S OF A1	1-0 W OF AC	21055	A356
A272	C-0S1352	C-121-01685	E301	1989-00	5-0 S OF A2	1-0 E OF AC	21055	A357
A273	C-0S1352	C-121-01685	E301	1989-00	A2	1-0 E OF AC	21055	A358
A274	C-0S1352	C-121-01685	E301	1989-00	3-6 S OF A1	1-0 E OF AC	21055	A359
A275	C-0S1352	C-121-01871	E301	1989-00	3-6 N OF A3	1-0 W OF AA	21055	A360
A276	C-0S1352	C-121-01871	E301	1989-00	A2	1-0 W OF AA	21055	A361
A277	C-0S1352	C-121-01871	E301	1989-00	3-6 S OF A1	1-0 W OF AA	21055	A362
A278	C-0S1511	C-121-01622	FW821	2047-02	A13	AK	-----	INACCESSIBLE
A279	C-0S1511	C-121-01622	FW821	2047-02	A11	AK	-----	INACCESSIBLE
A280	C-0S1222	C-121-00127	E111	1989-08	A6	1-0 W OF AN	20994	A373/A374
A281	C-0S1222	C-121-00127	E111	1989-08	8-3 N OF A5	1-0 W OF AN	20994	A375/A376
A282	C-0S1222	C-121-00127	E111	1989-08	A4	1-0 E OF CA	-----	N/A
A283	C-0S1222	C-121-00127	E111	1989-08	1-0 N OF A2	10-0 E OF AN	20994	A377/A378
A284	C-0S1222	C-121-00127	E111	1989-08	1-0 N OF A2	AM	20993	A379
A285	C-0S1222	C-121-00127	E111	1989-08	2-0 S OF A1	AM	-----	N/A
A286	C-0S1222	C-121-00127	E111	1989-08	1-0 N OF A2	10-0 E OF AM	20994	A380/A381
A287	C-0S1222	C-121-00127	E111	1989-08	2-0 S OF A1	AK	20994	A382
A288	C-0S1242	C-121-00128	E112	2015-00	A3	1-0 E OF AK	21350	A843
A289	C-0S1242	C-121-00128	E112	2015-00	11-9 N OF A3	1-0 E OF AK	20991	A386
A290	C-0S1242	C-121-00128	E112	2015-00	11-9 N OF A3	1-6 W OF AJ	20992	A385/A640
A291	C-0S1242	C-121-00128	E112	2015-00	A2	1-0 E OF AK	20991	A386
A292	C-0S1242	C-121-00128	E112	2015-00	1-0 S OF A1	AF	21350	A673
A293	C-0S1242	C-121-00128	E112	1989-8	A2	1-0 E OF AK	20991	A387/A388/A679
A294	C-0S1242	C-121-00128	E112	1989-8	1-0 N OF A3	AJ	21429	A799
A295	C-0S1242	C-121-00128	E112	1989-8	2-0 S OF A1	0-6 E OF AH	20991	A389
A296	C-0S1242	C-121-00128	E112	1989-8	2-0 S OF A1	8-6 E OF AH	-----	N/A
A297	C-0S1242	C-121-00128	E112	1989-8	2-0 S OF A1	1-0 W OF AF	-----	N/A
A298	C-0S1242	C-121-00128	E112	1989-8	8-4 S OF A1	0-6 E OF AH	20992	A390
A299	C-0S1242	C-121-00128	E112	1989-8	8-4 S OF A1	8-6 E OF AH	20992	A391
A300	C-0S1242	C-121-00128	E112	1989-8	8-4 S OF A1	1-0 W OF AF	20992	A392
A301	C-0S1242	C-121-00980	E211	2016-02	1-0 N OF A14	AH3	21195	A727/A756
A302	C-0S1242	C-121-00980	E211	2016-02	1-0 N OF A14	AJ	21195	A728/A757
A303	C-0S1242	C-121-00980	E211	2016-02	A13	2-0 E OF AK	21195	A715

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A304	C-0S1242	C-121-00980	E211	2016-02	A11	2-0 E OF AK	-----	N/A
A305	C-0S1242	C-121-00980	E211	2016-02	8-0 N OF A11	2-0 E OF AK	21195	A718
A306	C-0S1242	C-121-00980	E211	2016-02	A10	2-0 E OF AK	-----	N/A
A307	C-0S1242	C-121-00980	E211	2016-02	8-0 N OF A10	2-0 E OF AK	-----	N/A
A308	C-0S1242	C-121-00980	E211	2016-02	A9	2-0 E OF AK	-----	N/A
A309	C-0S1242	C-121-00980	E211	2016-02	1-6 N OF A12	1-6 W OF AJ	21313	A786
A310	C-0S1242	C-121-00980	E211	2016-02	8-0 N OF A11	1-6 W OF AJ	21195	A717/A718
A311	C-0S1242	C-121-00980	E211	2016-02	A10	1-6 W OF AJ	21195	A719
A312	C-0S1242	C-121-00980	E211	2016-02	6-0 N OF A10	1-6 W OF AJ	21195	A720
A313	C-0S1242	C-121-00980	E211	2016-02	A9	1-6 W OF AJ	21195	A721/A722
A314	C-0S1242	C-121-00980	E211	2016-02	7-0 N OF A9	1-6 W OF AJ	-----	N/A
A315	C-0S1311	C-121-00130	E203	2000-00	A9	1-0 E OF CA	20924	A493/A494/A495/A496
A316	C-0S1311	C-121-00130	E203	2000-00	2-0 N OF A14	6-0 E OF CA	20933	A497/A498
A317	C-0S1311	C-121-00130	E203	2000-00	2-0 N OF A14	AN	20933	A517/A518/A519/A520
A318	C-0S1311	C-121-00130	E203	2000-00	2-0 N OF A14	AL	20933	A785
A319	C-0S1311	C-121-00130	E203	2000-00	2-0 N OF A14	7-8 E OF AL	20933	A521/A522/A780
A320	C-0S1311	C-121-00130	E203	2000-00	2-0 N OF A14	AK	20933	A499/A500
A321	C-0S1312	C-121-01871	E110	2015-00	1-0 N OF A9	AK	21005	A535/A536/A537/538
A322	C-0S1312	C-121-01871	E110	2015-00	1-0 N OF A9	8-5 E OF AL	21052	A539
A323	C-0S1312	C-121-01871	E110	2015-00	A8	2-0 E OF AL	21051	A540/A761
A324	C-0S1312	C-121-01871	E110	2015-00	A7	2-0 E OF AL	21051	A541
A325	C-0S1312	C-121-01871	E110	2015-00	A6	2-0 E OF AL	-----	N/A
A326	C-0S1321	C-121-00034	E103	2000-00	A4	1-0 E OF CA	20921	A479
A327	C-0S1321	C-121-00034	E103	2000-00	2-0 S OF A1	10-0 E OF AN	20922	A480/A481/A482/A526/A527/A528
A328	C-0S1321	C-121-00034	E103	2000-00	2-0 S OF A1	10-0 E OF AM	20922	A483/A484/A485
A329	C-0S1331	C-121-01635	E204	2000-00	2-0 N OF A14	2-6 E OF AK	21399	A817
A330	C-0S1331	C-121-01635	E204	2000-00	2-0 N OF A14	2-6 W OF AJ	21399	A818
A331	C-0S1331	C-121-01635	E204	2000-00	2-0 N OF A14	3-6 W OF AG	21399	A819/A820/A821
A332	C-0S1352	C-121-01549	E302	2000-00	5-0 N OF A2.6	1-0 E OF AE	21050	A641
A333	C-0S1352	C-121-01549	E302	2000-00	5-0 S OF A2	1-0 E OF AE	21050	A642
A334	C-0S1352	C-121-01549	E302	2000-00	5-7 N OF A2	1-0 E OF AE	21050	A643
A335	C-0S1352	C-121-01549	E302	2000-00	4-2 S OF A1	1-0 E OF AE	21050	A644
A336	C-0S1352	C-121-01549	E302	2000-00	0-6 N OF A3	1-0 W OF AC	21050	A645
A337	C-0S1352	C-121-01549	E302	2000-00	5-0 N OF A2.6	1-0 W OF AC	21050	A646
A338	C-0S1352	C-121-01549	E302	2000-00	5-0 S OF A2	1-0 W OF AC	21050	A647
A339	C-0S1352	C-121-01549	E302	2000-00	0-6 N OF A3	1-0 E OF AC	21050	A648
A340	C-0S1352	C-121-01549	E302	2000-00	5-0 N OF A2.6	1-0 E OF AC	21050	A649
A341	C-0S1352	C-121-01549	E302	2000-00	5-0 S OF A2	1-0 E OF AC	21050	A650
A342	C-0S1352	C-121-01549	E302	2000-00	A2.6	1-0 W OF AA	21050	A651
A343	C-0S1352	C-121-01549	E302	2000-00	5-0 N OF A2.6	1-0 W OF AA	21050	A652
A344	C-0S1352	C-121-01549	E302	2000-00	5-0 S OF A2	1-0 W OF AA	21050	A653
A345	C-0S1352	C-121-01549	E302	2000-00	A2	1-0 W OF AA	21050	A654
A346	C-0S1352	C-121-01549	E302	2013-06	3-0 S OF A3	1-0 E OF AE	21049	A655/A656
A347	C-0S1352	C-121-01549	E302	2013-06	3-6 N OF A3	1-0 E OF AE	21049	A657/A683
A348	C-0S1352	C-121-01549	E302	2013-06	A2.6	1-0 E OF AE	21352	A781
A349	C-0S1352	C-121-01549	E302	2013-06	A3	1-0 W OF AC	21050	A658
A350	C-0S1352	C-121-01549	E302	2013-06	4-6 S OF A2.6	1-0 W OF AC	21050	A659
A351	C-0S1352	C-121-01549	E302	2013-06	A2.6	1-0 W OF AC	21352	A782
A352	C-0S1352	C-121-01549	E302	2013-06	4-6 S OF A2.6	1-0 E OF AC	21050	A660
A353	C-0S1352	C-121-01549	E302	2013-06	A2.6	1-0 E OF AC	21352	A733
A354	C-0S1352	C-121-01549	E302	2013-06	5-0 N OF A2.6	1-0 E OF AC	21050	A661

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STRUCTURAL JOINTS TRACKING

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A355	C-0S1352	C-121-01549	E302	2013-06	5-0 S OF A2	1-0 E OF AC	21050	A662
A356	C-0S1352	C-121-01549	E302	2013-06	A2	1-0 E OF AC	21050	A663
A357	C-0S1352	C-121-01549	E302	2013-06	5-7 N OF A2	1-0 E OF AC	21049	A664/A665
A358	C-0S1352	C-121-01549	E302	2013-06	3-6 S OF A1	1-0 E OF AC	21049	A666/A667
A359	C-0S1352	C-121-01549	E302	2013-06	3-0 S OF A3	1-0 W OF AA	21050	A668
A360	C-0S1352	C-121-01549	E302	2013-06	3-6 N OF A3	1-0 W OF AA	21049	A669/A670
A361	C-0S1352	C-121-01549	E302	2013-06	A2.6	1-0 W OF AA	21352	A784
A362	C-0S1352	C-121-01561	FW815	2013-06	0-6 N OF A2	4-4 W OF AC	20942	A513
A363	C-0S1352	C-121-01561	FW815	2013-06	2-0 S OF A1	AD	20942	A514
A364	C-0S1352	C-121-01561	FW815	2013-06	2-0 S OF A1	4-4 W OF AC	20943	A515/A516
A365	C-0S1352	C-121-01561	FW815	2013-06	C2	DA	21352	INACCESSIBLE
A366	C-0S1352	C-121-01561	FW815	2013-06	C2	DA	21352	INACCESSIBLE
A367	C-0S1352	C-121-01561	FW815	2013-06	C2.6	DA	21352	INACCESSIBLE
A368	C-0S1352	C-121-01683	E809	2026-00	A2.6	1-0 E OF AE	21352	A635
A369	C-0S1411	C-121-00165	E205	2026-00	1-0 N OF A14	AK	21024	INACCESSIBLE
A370	C-0S1411	C-121-00165	E205	2026-00	1-0 N OF A14	8-4 W OF AK	21022	A581/A582
A371	C-0S1411	C-121-00165	E205	2026-00	1-0 N OF A14	AN	21023	A583/A584
A372	C-0S1411	C-121-00165	E205	2026-00	A9	1-0 E OF CA	21022	A585/A586/A587/A803
A373	C-0S1421	C-121-00971	E105	2026-00	1-0 S OF A1	2-6 E OF CA	20910	A501/A502/A503
A374	C-0S1421	C-121-00971	E105	2026-00	1-0 S OF A1	AN	20910	A504/A505/A506
A375	C-0S1421	C-121-00971	E105	2026-00	1-0 S OF A1	10-0 E OF AN	20910	A507/A508/A509
A376	C-0S1431	C-121-00617	E206	2026-00	1-0 N OF A14	AJ	21470	A803
A377	C-0S1431	C-121-00617	E206	2026-00	1-0 N OF A14	AH3	21118	A689/A690
A378	C-0S1431	C-121-00617	E206	2026-00	1-0 N OF A14	3-10 E OF AH2	21118	A691/A692
A379	C-0S1431	C-121-00617	E206	2026-00	7-0 S OF A13	1-0 W OF AG	21118	A693/A694
A380	C-0S1431	C-121-00617	E206	2026-00	1-0 N OF A13.1	AG	-----	A778
A381	C-0S1431	C-121-00617	E206	2026-00	1-0 N OF A13.1	AF6	21118	A695/A696
A382	C-0S1431	C-121-00617	E206	2026-00	1-0 N OF A13.1	11-2 E OF AF6	21118	A697/A698
A383	C-0S1431	C-121-00617	E206	2026-00	14-11 N OF A13.1	1-0 W OF AD1	21118	A699/A700
A384	C-0S1441	C-121-01700	E106	2026-00	1-0 S OF A1	AJ	20903	A458/A459
A385	C-0S1441	C-121-01700	E106	2026-00	1-0 S OF A1	11-6 E OF AJ	20903	A460/A461/A462
A386	C-0S1441	C-121-01700	E106	2026-00	1-0 S OF A1	AH	20903	A463/A464/A465/A466
A387	C-0S1441	C-121-01700	E106	2026-00	1-0 S OF A1	8-6 E OF AH	20903	A467/A468
A388	C-0S1441	C-121-01700	E106	2026-00	1-0 S OF A1	AF	20903	A469/A470
A389	C-0S1441	C-121-01700	E106	2026-00	11-0 S OF A2	1-0 W OF AE	-----	A639
A390	C-0S1521	C-121-00912	E401	2047-06	A7	1-0 E OF CA	-----	N/A
A391	C-0S1211	C-121-00973	E201	1988-00	2-0 N OF A14	AK	21144	A702/A703
A392	C-0S1531	C-121-00629	E502	2047-06	1-0 N OF A14	1-2 E OF AH2	21007	A574/A671
A393	C-0S1531	C-121-00629	E502	2047-06	1-0 N OF A13.1	AG	21352	INACCESSIBLE
A394	C-0S1531	C-121-00629	E502	2047-06	1-0 N OF A13.1	AF6	21007	A744
A395	C-0S1531	C-121-00629	E502	2047-06	1-0 N OF A13.1	2-6 W OF AD1	21009	A575/A576
A396	C-0S1531	C-121-00629	E502	2047-06	14-11 N OF A13.1	1-0 W OF AD1	21008	A672
A397	C-0S1621	C-121-00274	E403	2073-02	A5	1-0 E OF CA	20935	A523/A524
A398	C-0S1621	C-121-00274	E403	2073-02	A4	1-0 E OF CA	20936	A525/A809
A399	C-0S1621	C-121-00274	E403	2073-02	A3	1-0 E OF CA	20936	A542
A400	C-0S1212	C-121-01776	FW825	1989-08	6-1 N OF A14	AN	-----	N/A
A401	C-0S1212	C-121-01776	FW825	1989-08	A12	6-0 E OF CA	-----	N/A
A402	C-0S1212	C-121-01776	FW825	1989-08	5-3 S OF A9	7-9 E OF AN	20923	A510
A403	C-0S1212	C-121-01776	FW825	1989-08	5-3 S OF A9	7-9 W OF AL	20923	A511
A404	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A14	2-6 E OF AK	20907	A471
A405	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A14	2-6 W OF AJ	20907	A472

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A406	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A14	AJ	20907	VOID SAME AS JOINT AA
A407	C-0S1231	C-121-00976	E202	1988-00	12-4 N OF A14	2-0 W OF A0	20907	A474
A408	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A13.1	AG	21352	INACCESSIBLE
A409	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A13.1	AF6	21352	INACCESSIBLE
A410	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A13.1	7-1 E OF AF6	21352	INACCESSIBLE
A411	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A13.1	10-7 W OF AD1	21352	INACCESSIBLE
A412	C-0S1231	C-121-00976	E202	1988-00	2-0 N OF A13.1	3-6 W OF AD1	20901	INACCESSIBLE
A413	C-0S1231	C-121-00976	E202	1988-00	11-7 N OF A13.1	2-0 W OF AD1	20902	A477/A478
A414	C-0S1241	C-121-00007	E801	1988-00	5-5 N OF A2	6-0 W OF AF	-----	N/A
A415	C-0S1241	C-121-00007	E801	1988-00	5-5 N OF A2	1-0 W OF AF	-----	N/A
A416	C-0S1241	C-121-00007	E801	1995-00	5-5 N OF A2	6-0 W OF AF	-----	N/A
A417	C-0S1452	C-121-10675	E702	2037-06	6-6 S OF A3	1-0 E OF AE	20997	A673
A418	C-0S1452	C-121-10675	E702	2037-06	A3	1-0 E OF AE	21352	A753
A419	C-0S1452	C-121-10675	E702	2037-06	8-9 S OF A2	1-0 E OF AE	20995	A593/A594
A420	C-0S1452	C-121-10675	E702	2041-10	8-9 S OF A2	1-0 E OF AE	20995	A595/A596
A421	C-0S1452	C-121-10675	E702	2041-10	A2	1-0 E OF AE	-----	N/A
A422	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	3-9 E OF AE	20995	A597/A598
A423	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	8-3 E OF AE	-----	N/A
A424	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	1-3 W OF AD	20995	A610
A425	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	1-3 E OF AD	-----	N/A
A426	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	3-9 E OF AD	-----	N/A
A427	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	3-9 W OF AC	-----	N/A
A428	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	2-0 W OF AC	20996	A611
A429	C-0S1452	C-121-10675	E702	2037-06	2-6 S OF A3	1-0 W OF AC	-----	N/A
A430	C-0S1452	C-121-10675	E702	2037-06	A3	1-0 W OF AC	20995	A599/A600
A431	C-0S1452	C-121-10675	E702	2037-06	8-9 S OF A2	1-0 W OF AC	20995	A601/A602
A432	C-0S1452	C-121-10675	E702	2041-10	8-9 S OF A2	1-0 W OF AC	20995	A603
A433	C-0S1452	C-121-10675	E702	2041-10	A2	1-0 W OF AC	20995	A604
A434	C-0S1452	C-121-10675	E702	2037-06	2-6 S OF A3	1-0 E OF AC	-----	N/A
A435	C-0S1452	C-121-10675	E702	2037-06	A3	1-0 E OF AC	20995	A605/A606
A436	C-0S1452	C-121-10675	E702	2037-06	8-9 S OF A2	1-0 E OF AC	20995	A607
A437	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	2-0 E OF AC	20996	A612
A438	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	3-9 E OF AC	20996	A615/A616
A439	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	8-3 E OF AC	20995	A613/A614
A440	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	1-3 W OF AB	20996	A617
A441	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	1-3 E OF AB	-----	N/A
A442	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	3-9 E OF AB	-----	N/A
A443	C-0S1452	C-121-10675	E702	2041-10	2-0 S OF A1	3-9 W OF AA	-----	N/A
A444	C-0S1452	C-121-10675	E702	2037-06	6-6 S OF A3	1-0 W OF AA	-----	N/A
A445	C-0S1452	C-121-10675	E702	2037-06	A3	1-0 W OF AA	20995	A608/A609
A446	C-0S1211	C-121-00961	FW812	1988-00	5-0 S OF A8	AN	-----	N/A
A447	C-0S1211	C-121-00961	FW812	1988-00	5-0 S OF A8	7-9 E OF AN	-----	N/A
A448	C-0S1211	C-121-00961	FW812	1988-00	4-6 S OF A5	7-9 E OF AN	-----	N/A
A449	C-0S1211	C-121-00961	FW812	1988-00	4-6 S OF A5	4-5 W OF AM	-----	N/A
A450	C-0S1211	C-121-00961	FW812	1988-00	A10	3-6 W OF AJ	-----	N/A
A451	C-0S1211	C-121-00961	FW812	1988-00	7-0 N OF A10	7-0 W OF AJ	-----	N/A
A452	C-0S1211	C-121-00961	FW812	1988-00	7-0 N OF A10	AJ	-----	N/A
A453	C-0S1211	C-121-00961	FW812	1988-00	6-6 N OF A9	7-0 W OF AJ	21351	A810
A454	C-0S1211	C-121-00961	FW812	1988-00	6-6 N OF A9	AJ	-----	N/A
A455	C-0S1211	C-121-01621	FW820	1988-00	0-9 N OF A13	AL	21020	A546
A456	C-0S1211	C-121-01621	FW820	1988-00	0-9 N OF A13	6-8 W OF AK	21020	A547

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*       BECHTEL
*JOINT . DRAWING .  ERECTION   .DRAW  .ELEVATON. ----------- LOCATION -----------: NCR  .  EVALUATION NO.
*======.=========.=============.======.=========.================.================.======.==================================
 A457   C-0S1241  C-121-00962  FW813  1988-00  A3               AF                21010  A553
 A458   C-0S1241  C-121-00962  FW813  1988-00  11-0 S OF A2     AF                21010  A554/A555
 A459   C-0S1511  C-121-01636  E501   2047-02  1-0 N OF A14     AL                21044  A631/A632/
 A460   C-0S1511  C-121-01636  E501   2047-02  1-0 N OF A14     AK                21044  A633/A634/A754/A755
 A461   C-0S1211  C-121-01780  FW827  1988-00  6-9 N OF A14     AL                21007  A548
 A462   C-0S1211  C-121-01780  FW827  1988-00  6-9 N OF A14     6-8 W OF AK       21007  A549
 A463   C-0S1211  C-121-01780  FW827  1988-00  6-3 S OF A13     AL                21007  A550
 A464   C-0S1211  C-121-01780  FW827  1988-00  6-3 S OF A13     6-8 W OF AK       21007  A551
 A465   C-0S1241  C-121-01945  FW839  1988-00  9-3 N OF A7      AK                20998  A556
 A466   C-0S1241  C-121-01945  FW839  1988-00  9-3 N OF A7      1-6 E OF AJ1      21352  A557/A758
 A467   C-0S1241  C-121-01945  FW839  1988-00  9-3 N OF A7      1-0 W OF AJ       21352  A558/A759
 A468   C-0S1211  C-121-01976  FW841  1988-00  5-3 N OF A9      8-4 W OF AK       -----  N/A
 A469   C-0S1211  C-121-01976  FW841  1988-00  5-3 N OF A9      AK                21006  A552
 A470   C-0S1641  C-121-01883  FW838  2073-02  1-7 N OF A3.3    1-0 W OF AE       21045  A635/A636
 A471   C-0S1641  C-121-01883  FW838  2073-02  A3               1-0 W OF AE       21045  A637/A638
 A472   C-0S1641  C-121-01883  FW838  2073-02  A2               1-0 W OF AE       -----  VOID                    LADDER
 A473   C-0S1313  C-121-01884  E601   2011-06  12-10 S OF A11   1-0 W OF AD1      21000  A588
 A474   C-0S1313  C-121-01884  E601   2011-06  4-5 S OF A11     1-0W OF AD1       20999  A589
 A475   C-0S1313  C-121-01884  E601   2011-06  A11              AG                21000  A590
 A476   C-0S1313  C-121-01884  E601   2011-06  8-6 S OF A9      1-6 E OF AJ       20999  A591
 A477   C-0S1313  C-121-01884  E601   2011-06  1-11 N OF A9     1-6 E OF AJ       21000  A592
 A478   C-0S1313  C-121-01885  E602   2012-03  1-6 N OF A5      2-5 W OF AH4      -----  N/A
 A479   C-0S1313  C-121-01885  E602   2012-03  1-6 N OF A5      4-9 E OF AH4      21470  A532
 A480   C-0S1313  C-121-01885  E602   2012-03  1-8 N OF A3.3    1-0 W OF AE       21005  A533
 A481   C-0S1313  C-121-01885  E602   2012-03  8-5 N OF A3.3    1-0 W OF AE       21005  A534
 A482   C-0S1019  C-121-00978  E208   2062-05  1-0 N OF A14     AJ                21021  A618/A619
 A483   C-0S1019  C-121-00978  E208   2062-05  1-0 N OF A14     AH3               21021  A620
 A484   C-0S1221  C-121-01773  FW824  1988-00  5-3 S OF A5      7-0 W OF AJ       21397  A340
 A485   C-0S1221  C-121-01773  FW824  1988-00  5-3 S OF A5      AJ                -----  N/A
 A486   C-0S1221  C-121-01773  FW824  1988-00  5-0 N OF A6      7-9 W OF AL       -----  N/A
 A487   C-0S1221  C-121-01773  FW824  1988-00  5-0 N OF A6      AL                -----  N/A
 A488   C-0S1221  C-121-01773  FW824  1988-00  5-0 N OF A6      8-4 E OF AL       -----  N/A
 A489   C-0S1221  C-121-01773  FW824  1988-00  6-3 S OF A5      7-9 W OF AL       -----  N/A
 A490   C-0S1221  C-121-01773  FW824  1988-00  6-3 S OF A5      AL                -----  N/A
 A491   C-0S1221  C-121-01773  FW824  1988-00  6-3 S OF A5      8-4 E OF AL       -----  VOID          NO CONNECTION REQUIRED
 A492   C-0S1014  C-121-01790  E811   2030-00  5-6 S OF A1      1-0 E OF AE       21025  A621
 A493   C-0S1014  C-121-01790  E811   2030-00  2-10 S OF A1     1-0 E OF AE       21025  A622
 A494   C-0S1014  C-121-01790  E811   2030-00  2-0 S OF A1      AD                21025  A623
 A495   C-0S1014  C-121-01790  E811   2030-00  5-6 S OF A1      1-0 W OF AC       21025  A624
 A496   C-0S1014  C-121-01790  E811   2030-00  2-10 S OF A1     1-0 W OF AC       21025  A625
 A497   C-0S1014  C-121-01790  E811   2030-00  5-6 S OF A1      1-0 E OF AC       21025  A626
 A498   C-0S1014  C-121-01790  E811   2030-00  2-10 S OF A1     1-0 E OF AC       21025  A627
 A499   C-0S1014  C-121-01790  E811   2030-00  2-0 S OF A1      AB                21025  A628
 A500   C-0S1014  C-121-01790  E811   2030-00  5-6 S OF A1      1-0 W OF AA       21025  A629
 A501   C-0S1014  C-121-01790  E811   2030-00  2-10 S OF A1     1-0 W OF AA       21025  A630
 A502   C-0S1751  C-121-12026  E706   2102-06  1-9 S OF A2      AE                21004  A559/A560
 A503   C-0S1751  C-121-12026  E706   2102-06  1-9 S OF A2      6-0 E OF AE       21003  A561
 A504   C-0S1751  C-121-12026  E706   2102-06  1-9 S OF A2      AD                21004  A562/A563
 A505   C-0S1751  C-121-12026  E706   2102-06  1-9 S OF A2      6-0 E OF AD       21004  A564/A565
 A506   C-0S1751  C-121-12026  E706   2102-06  1-9 S OF A2      AC                21003  A566
 A507   C-0S1751  C-121-12026  E706   2102-06  1-9 S OF A2      6-0 E OF AC       21004  A567/A568
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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A508	C-0S1751	C-121-12026	E706	2102-06	1-9 S OF A2	AB	21003	A569
A509	C-0S1751	C-121-12026	E706	2102-06	1-9 S OF A2	6-0 E OF AB	21004	A570/A571
A510	C-0S1751	C-121-12026	E706	2102-06	1-9 S OF A2	AA	21003	A572
A511	C-0S1541	C-121-00627	E402	2047-06	10-6 S OF A2	1-0 W OF AE	21352	A793
A512	C-0S1221	C-121-01773	FW824	1988-00	4-0 N OF A5	AM	21220	A725
A513	C-0S1221	C-121-01773	FW824	1988-00	4-0 N OF A5	7-2 E OF AM	-----	N/A
A514	C-0S1241	C-121-10657	FW834	1988-00	0-8 N OF A3.1	1-0 W OF AE	-----	N/A
A515	C-0S1241	C-121-10657	FW834	1988-00	A3	1-0 W OF AE	-----	N/A
A516	C-0S1441	C-121-01700	E106	2026-00	A5	AH4	21352	INACCESSIBLE
A517	C-0S1621	C-121-00274	E403	2073-04	A6.3	1-0 E OF CA'	21352	A306
A518	C-0S1452	C-121-10731	E705	2090-00	4-6 S OF A3	0-6 E OF AE	21352	A787
A519	C-0S1452	C-121-10731	E705	2090-00	A3	0-6 E OF AE	21352	A788
A520	C-0S1452	C-121-10731	E705	2090-00	6-3 N OF A2.6	0-6 E OF AE	21352	A789
A521	C-0S1452	C-121-10731	E705	2090-00	3-9 N OF A2	0-6 E OF AE	21352	A790
A522	C-0S1452	C-121-10731	E705	2090-00	2-6 S OF A3	0-6 E OF AE	21352	A791
A523	C-0S1452	C-121-10731	E705	2090-00	A3	AC	21352	A792
A524	C-0S1452	C-121-10731	E705	2050-00	6-3 N OF A2.6'	AC	21352	A793
A525	C-0S1452	C-121-10731	E705	2090-00	3-9 N OF A2'	AC	21352	A794
A526	C-0S1452	C-121-10731	E705	2090-00	4-6 S OF A3	1-0 W OF AA	21008	A708
A527	C-0S1452	C-121-10731	E705	2090-00	AE	1-0 W OF AA	21003	A709/A710
A528	C-0S1452	C-121-10731	E705	2090-00	6-3 N OF A2.6	1-0 W OF AA	21008	A711/A712
A529	C-0S1452	C-121-10731	E705	2090-00	3-9 N OF A2	1-0 W OF AA	21003	A713/A714
A530	C-0S1751	C-121-12027	E707	2089-04	6-0 S OF A2	1-0 W OF AE	-----	N/A
A531	C-0S1751	C-121-12027	E707	2086-01	6-0 S OF A2	1-0 W OF AE	-----	N/A
A532	C-0S1751	C-121-12027	E707	2089-04	1-0 N OF A2	1-0 W OF AE	-----	N/A
A533	C-0S1751	C-121-12027	E707	2086-01	1-0 N OF A2	1-0 W OF AE	-----	N/A
A534	C-0S1019	C-121-00978	E208	2038-04	1-0 N OF A14	AH3	21399	A822/A823
A535	C-0S1019	C-121-00778	E208	2038-04	1-0 N OF A14	5-11 E OF AH3	21399	A824/A825
A536	C-0S1019	C-121-00978	E208	2038-04	1-0 N OF A14	2-6 W OF AG	21399	A826/A827
A537	C-0S1019	C-121-00978	E208	2033-04	11-0 N OF A14	1-0 W OF AG	21399	A828
A538	C-0S1211	C-121-00961	FW812	1988-0	10-8 S OF A7	5-0 E OF AJ1	-----	N/A
A539	C-0S1751	C-121-12026	E706	2096-03	1-9 S OF A2	2-6 E OF AA	-----	N/A
A540	C-0S1751	C-121-12027	E707	2096-10	1-9 N OF A2	AE	21169	A707
A541	C-0S1906	C-131-05794	5B-E1	2069-04	A1	2-6 E OF AA	-----	N/A
A542	C-0S1906	C-131-05794	5B-E1	2073-01	A1	2-6 E OF AA	-----	N/A
A543	C-0S1906	C-131-05794	5B-E1	2076-10	A1	2-6 E OF AA	-----	N/A
A544	C-0S1906	C-131-05794	5B-E1	2080-07	A1	2-6 E OF AA	-----	N/A
A545	C-0S1906	C-131-05794	5B-E1	2084-04	A1	2-6 E OF AA	-----	N/A
A546	C-0S1906	C-131-05794	5B-E1	2069-24	A1	3-10 W OF AB	-----	N/A
A547	C-0S1906	C-131-05794	5B-E1	2073-01	A1	3-10 W OF AB	-----	N/A
A548	C-0S1906	C-131-05794	5B-E1	2076-10	A1	3-10 W OF AB	-----	N/A
A549	C-0S1906	C-131-05794	5B-E1	2080-07	A1	3-10 W OF AB	-----	N/A
A550	C-0S1906	C-131-05794	5B-E1	2084-04	A1	3-10 W OF AB	-----	N/A
A551	C-0S1906	C-131-05794	5B-E1	2069-04	A1	2-6 E OF AB	-----	N/A
A552	C-0S1906	C-131-05794	5B-E1	2073-01	A1	2-6 E OF AB	-----	N/A
A553	C-0S1906	C-131-05794	5B-E1	2076-10	A1	2-6 E OF AB	-----	N/A
A554	C-0S1906	C-131-05794	5B-E1	2080-07	A1	2-6 E OF AB	-----	N/A
A555	C-0S1906	C-131-05794	5B-E1	2084-04	A1	2-6 E OF AB	-----	N/A
A556	C-0S1906	C-131-05794	5B-E1	2069-04	A1	3-10 W OF AC	-----	N/A
A557	C-0S1906	C-131-05794	5B-E1	2073-01	A1	3-10 W OF AC	-----	N/A
A558	C-0S1906	C-131-05794	5B-E1	2076-10	A1	3-10 W OF AC	-----	N/A

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STRUCTURAL JOINTS TRACKING

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
A559	C-0S1906	C-131-05794	58-E1	2080-07	A1	3-10 W OF AC	-----	N/A
A560	C-0S1906	C-131-05794	58-E1	2084-04	A1	3-10 W OF AC	-----	N/A
A561	C-0S1906	C-131-05794	58-E1	2069-04	A1	2-6 E OF AC	-----	N/A
A562	C-0S1906	C-131-05794	58-E1	2073-01	A1	2-7 E OF AC	-----	N/A
A563	C-0S1906	C-131-05794	58-E1	2076-10	A1	2-6 E OF AC	-----	N/A
A564	C-0S1906	C-131-05794	58-E1	2080-07	A1	2-6 E OF AC	-----	N/A
A565	C-0S1906	C-131-05794	58-E1	2084-04	A1	2-6 E OF AC	-----	N/A
A566	C-0S1906	C-131-05794	58-E1	2067-04	A1	3-10 W OF AD	-----	N/A
A567	C-0S1906	C-131-05794	58-E1	2073-01	A1	3-10 W OF AD	-----	N/A
A568	C-0S1906	C-131-05794	58-E1	2076-10	A1	3-10 W OF AD	-----	N/A
A569	C-0S1906	C-131-05794	58-E1	2080-07	A1	3-10 W OF AD	-----	N/A
A570	C-0S1906	C-131-05794	58-E1	2084-04	A1	3-10 W OF AD	-----	N/A
A571	C-0S1906	C-131-05794	58-E1	2069-04	A1	2-6 E OF AD	-----	N/A
A572	C-0S1906	C-131-05794	58-E1	2073-01	A1	2-6 E OF AD	-----	N/A
A573	C-0S1906	C-131-05794	58-E1	2076-10	A1	2-6 E OF AD	-----	N/A
A574	C-0S1906	C-131-05794	58-E1	2080-07	A1	2-6 E OF AD	-----	N/A
A575	C-0S1906	C-131-05794	58-E1	2084-04	A1	2-6 E OF AD	-----	N/A
A576	C-0S1906	C-131-05794	58-E1	2069-04	A1	3-10 W OF AE	-----	N/A
A577	C-0S1906	C-131-05794	58-E1	2073-01	A1	3-10 W OF AE	-----	N/A
A578	C-0S1906	C-131-05794	58-E1	2076-10	A1	3-10 W OF AE	-----	N/A
A579	C-0S1906	C-131-05794	58-E1	2080-07	A1	3-10 W OF AE	-----	N/A
A580	C-0S1906	C-131-05794	58-E1	2069-04	A1	3-10 W OF AE	-----	N/A
A581	C-0S1352	C-121-01549	E302	2013-06	2-0 S OF A1	AD	21224	A723
A582	C-0S1352	C-121-01549	E302	2013-06	A2	1-0 W OF AA	21224	A724
A583	C-0S1908	C-131-05798	31-E2	2029-00	1-0 N OF A8	14-4 W OF AL	-----	N/A
A584	C-0S1908	C-131-05798	31-E2	2029-00	1-0 S OF A7	14-4 W OF AL	-----	N/A
A585	C-0S1908	C-131-05798	31-E2	2029-00	7-7 N OF A8	1-0 W OF AL	21236	A731/A732
A586	C-0S1908	C-131-05798	31-E2	2029-00	9-0 S OF A7	1-0 W OF AL	-----	N/A
A587	C-0S1908	C-131-05798	31-E2	2029-00	5-7 S OF A7	1-0 W OF AL	21236	A733
A588	C-0S1708	C-131-05798	31-E2	2029-00	1-0 N OF A7	7-11 W OF AL	-----	N/A
A589	C-0S1908	C-131-05798	31-E2	2029-00	1-0 S OF A6	7-11 W OF AL	-----	N/A
A590	C-0S1908	C-131-05798	31-E2	2029-00	5-10 N OF A7	1-0 W OF AL	-----	N/A
A591	C-0S1908	C-131-05798	31-E2	2029-00	9-0 N OF A7	1-0 W OF AL	-----	N/A
A592	C-0S1908	C-131-05798	31-E2	2029-00	7-10 S OF A6	1-0 W OF AL	21236	A734
A593	C-0S1909	C-131-05799	31-E3	2041-00	1-0 N OF A8	8-9 W OF AL	-----	N/A
A594	C-0S1909	C-131-05799	31-E3	2041-00	1-0 S OF A7	8-9 W OF AL	-----	N/A
A595	C-0S1909	C-131-05799	31-E3	2041-00	7-10 N OF A8	1-0 W OF AL	21237	A729/A730
A596	C-0S1709	C-131-05799	31-E3	2041-00	5-10 S OF A7	1-0 W OF AL	-----	N/A
A597	C-0S1709	C-131-05799	31-E3	2041-00	1-0 N OF A7	8-9 W OF AL	-----	N/A
A598	C-0S1909	C-131-05799	31-E3	2041-00	1-0 S OF A6	8-9 W OF AL	-----	N/A
A599	C-0S1909	C-131-05799	31-E3	2041-00	5-10 N OF A7	1-0 W OF AL	-----	N/A
A600	C-0S1909	C-131-05799	31-E3	2041-00	7-10 S OF A6	1-0 W OF AL	-----	N/A
A601	C-0S1352	C-121-10639	FW833	2030-00	1-0 N OF A1	9-6 W OF AC	-----	N/A
A602	C-0S1352	C-121-10639	FW833	2030-00	1-6 S OF A0	9-6 W OF AC	21470	A701/A760
A603	C-0S1352	C-121-10639	FW833	2030-00	1-0 N OF A1	4-0 W OF AC	-----	N/A
A604	C-0S1352	C-121-10639	FW833	2030-00	1-6 S OF A0	4-0 W OF AC	-----	N/A
A605	C-0S1352	C-121-10639	FW833	2030-00	1-0 N OF A1	4-0 E OF AC	-----	N/A
A606	C-0S1352	C-121-10639	FW833	2030-00	1-6 S OF A0	4-0 E OF AC	-----	N/A
A607	C-0S1352	C-121-10639	FW833	2030-00	1-0 N OF A1	8-0 E OF AC	-----	N/A
A608	C-0S1352	C-121-10639	FW833	2030-00	1-6 S OF A0	8-0 E OF AC	-----	N/A
A609	C-0S1452	C-121-10675	E702	2041-10	A2	3-9 E OF AE	21273	A736

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO:	
A610	C-0S1452	C-121-10675	E702	2041-10	...	3-9 W OF AD	21273	A737	
A611	C-0S1452	C-121-10675	E702	2041-10	A2	3-9 E OF AD	21273	A738	
A612	C-0S1452	C-121-10675	E702	2041-10	A2	3-9 W OF AC	21273	A739	
A613	C-0S1452	C-121-10675	E702	2041-10	A2	3-9 E OF AC	21273	A740	
A614	C-0S1452	C-121-10675	E702	2041-10	A2	3-9 W OF AB	21273	A741	
A615	C-0S1452	C-121-10675	E702	2041-10	A2	3-9 W OF AB	21273	A742	
A616	C-0S1452	C-121-10675	E702	2041-10	A2	3-9 W OF AA	21273	A743	
A617	C-0S1313	C-121-01836	FW1	2011-06	A10	AH.2	21287	A762	
A618	C-0S1313	C-121-01886	FW1	2011-06	A10	AH.2	21287	A763	
A619	C-0S1313	C-121-01836	FW1	2011-06	A10.9	AF6	21287	A764	
A620	C-0S1313	C-121-01886	FW1	2011-06	A10.9	AF6	21287	A765	
A621	C-0S1313	C-121-10386	FW1	2011-06	A10.9	AF6	-----	N/A	
A622	C-0S1313	C-121-01887	FW2	2011-06	A11	AG	21272	A746	
A623	C-0S1313	C-121-01887	FW2	2011-06	A11	AG	-----	N/A	
A624	C-0S1313	C-121-01887	FW2	2011-06	A11	AG	21399	A807	
A625	C-0S1313	C-121-01887	FW2	2012-03	A3.3	AF	21272	A747	
A626	C-0S1313	C-121-01887	FW2	2012-03	A3.3	AF	-----	N/A	
A627	C-0S1313	C-121-01887	FW2	2012-03	A3.3	AF	21272	A748	
A628	C-0S1313	C-121-01887	FW2	2012-03	A3.9	AH1	21272	A749/A795	
A629	C-0S1313	C-121-01887	FW2	2012-03	A3.9	AH1	21272	A750	
A630	C-0S1313	C-121-01887	FW2	2012-03	A3.9	AH1	21272	A751	
A631	C-0S1313	C-121-01887	FW2	2012-03	A3.9	AH1	-----	N/A	
A632	C-0S1313	C-121-01887	FW2	2012-03	A3	AF	-----	N/A	
A633	C-0S1313	C-121-01887	FW2	2012-03	A3	AF	21399	A872	
A634	C-0S1313	C-121-01887	FW2	2012-03	A3	AF	21272	A752	
A635	C-0S1313	C-121-01887	FW2	2012-03	A3	AF	21399	A842	
A636	C-0S1313	C-121-01886	FW1	2011-06	A8.9	AH5	21287	A766	
A637	C-0S1313	C-121-01886	FW1	2011-06	A8.9	AH5	-----	N/A	
A638	C-0S1313	C-121-01886	FW1	2011-06	A8.9	AH5	-----	N/A	
A639	C-0S1313	C-121-01886	FW1	2011-06	A10	AH2	-----	N/A	
A640	C-0S1452	C-121-00934	E704	2055-06	0-4 N OF A3	1-0 E OF AE	21288	A767/A851/A852/A853	
A641	C-0S1452	C-121-00934	E704	2055-06	0-4 N OF A3	1-0 W OF AC	21288	A768/A769/A854/A855	
A642	C-0S1452	C-121-00934	E704	2055-06	6-0 N OF A2.6	1-0 E OF AE	21288	A770/A771/A856/A857	
A643	C-0S1452	C-121-00934	E704	2055-06	6-0 N OF A2.6	1-0 W OF AC	21288	A772/A858/A859/A860	
A644	C-0S1452	C-121-00934	E704	2055-06	0-4 N OF A3	1-0 E OF AC	21288	A773/A861/A862/A863	
A645	C-0S1452	C-121-00934	E704	2055-06	0-4 N OF A3	1-0 W OF AA	21288	A774/A864/A865/A866	
A646	C-0S1452	C-121-00934	E704	2055-06	6-0 N OF A2.6	1-0 E OF AC	21288	A775/A776/A867/A868	
A647	C-0S1452	C-121-00934	E704	2055-06	6-0 N OF A2.6	1-0 W OF AA	21288	A777/A869/A870/A871	
A648	C-0S1452	C-121-10731	E705	2090-00	2-6 S OF A3	0-6 W OF AC	21352	A795	
A649	C-0S1441	C-121-01700	E106	2026-00	0-6 S OF A5	AJ	21399	INACCESSIBLE	FCR 1-0360 C
A650	C-0S1212	C-121-01789	E210	1989-00	0-6 S OF A12	AN	21399	INACCESSIBLE	NCR 1SN0738C
A651	C-0S1751	C-121-12076	E706	2096-03	5-5 S OF A3.1	2-0 E OF AA	-----	N/A	NCR 1SN3753C
A652	C-0S1641	C-121-01929	E404	2073-02	16-0 S OF A3	8-6 E OF AH	21399	A831	NCR 1SN1283C
A653	C-0C1232			1988-00	3-3 N OF A11	5-4 W OF AG	21399	A832	NCR 1SN2154C
A654	C-0S1014	C-121-01790	E811	2030-00	2-0 S OF A1	5-6 E OF AE	-----	N/A	NCR 1SN6117C
A655	C-0S1014	C-121-01790	E811	2030-00	2-0 S OF A1	5-6 W OF AC	-----	N/A	NCR 1SN6117C
A656	C-0S1014	C-121-01790	E811	2030-00	2-0 S OF A1	5-6 E OF AC	-----	N/A	NCR 1SN6117C
A657	C-0S1014	C-121-01790	E811	2030-00	2-0 S OF A1	5-6 W OF AA	-----	N/A	NCR 1SN6117C
A658	C-0S1352	C-121-10639	FW833	2030-00	2-6 N OF A1	9-6 W OF AC	-----	N/A	NCR 1SN6795C
A659	C-0S1352	C-121-10639	FW833	2030-00	5-6 N OF A1	9-6 W OF AC	-----	N/A	NCR 1SN6775C
A660	C-0S1352	C-121-10639	FW833	2030-00	2-6 N OF A1	4-0 W OF AC	-----	N/A	NCR 1SN6795C

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 *       BECHTEL
 *JOINT . DRAWING .  ERECTION   .DRAW  .ELEVATON. ---------- LOCATION ----------- .  NCR  .   EVALUATION NO.
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  A661    C-0S1352  C-121-10639  FW833  2030-00  5-6 N OF A1      4-0 W OF AC      -----   N/A                                  NCR 1SN6795C
  A662    C-0C1232               "      1988-00  1-9 N OF A11     3-9 W OF AG      21399   A833                                 NCR 1SN2154C
  A663    C-0S1751  C-121-12027  E707   2093-03  5-5 S OF A3.1    0-6 W OF AE      -----   N/A                                  NCR 1SN3753C
  A664    C-0S1241  C-121-10657  FW834  1973-03  A3.1             2-6 W OF AE      21399   A834                                 FAB REQ. C-1050
  A665    C-0S1241  C-121-10657  FW834  1973-03  A3               2-6 W OF AE      21399   A835                                 FAB REQ. C-1050
  A666    C-0S1242  C-121-00128  E112   1989-08  A2               AJ               -----   N/A                                  FAB REQ.
  A667    C-0S1242  C-121-00128  E112   1989-08  A2               AH               21399   INACCESSIBLE                         FAB REQ.
  A668    C-0S1452  C-121-10675  E702   2042-00  A2               2-0 E OF AE      -----   N/A                                  FAB REQ. 505
  A669    C-0S1452  C-121-10675  E702   2042-00  8-9 S OF A2      AB               -----   N/A                                  FAB REQ.
  A670    C-0S1452  C-121-10675  E702   2042-00  8-9 S OF A2      AD               -----   INACCESSIBLE                         FAB REQ. 479
  A671    C-0S1452  C-121-10675  E702   2042-00  0-6 S OF A2      AD               -----   N/A                                  FAB REQ. 462
  A672    C-0S1751  C-121-01979  A702   2096-03  11-0 N OF A3.1   2-0 E OF AA      -----   N/A                                  FAB REQ. 634
  A673    C-0S1751  C-121-01979  A702   2096-03  14-0 N OF A3.1   2-0 E OF AA      -----   N/A                                  FAB REQ. 634
  A674    C-0S1751  C-121-01979  A702   2096-03  11-0 N OF A3.1   2-0 E OF AA      -----   N/A                                  FAB REQ. 634
  A675    C-0S1751  C-121-01979  A702   2096-03  14-0 N OF A3.1   2-0 E OF AA      -----   N/A                                  FAB REQ. 634
  A676    C-0S1751  C-121-01979  A702   2096-03  11-0 N OF A3.1   2-0 E OF AA      -----   N/A                                  FAB REQ. 634
  A677    C-0S1751  C-121-01979  A702   2096-03  14-0 N OF A3.1   2-0 E OF AA      -----   N/A                                  FAB REQ. 634
  A678    C-0S1452  C-121-0936   759    2042-00  0-9 N OF A2      3-7 E OF AD      -----   N/A                                  FAB REQ. 501
  A679    C-0S1452  C-121-0936   759    2042-00  A2               3-0 E OF AD      -----   N/A                                  FAB REQ. 501
  A680    C-0S1452  C-121-0936   759    2042-00  6-7 N OF A2      AD               -----   N/A                                  FAB REQ. 501
  A681    C-0S1452  C-121-10675  E702   2042-00  0-6 N OF A2      AD               -----   N/A
  A682    C-0S1352  C-121-01683  E809   2026-00  A2               1-0 E OF AE      21352   A873 .
  A683    C-0S1452  C-121-10675  E702   2042-00  2-0 S OF A1      2-0 E OF AE      21399   A837
  A684    C-0S1452  C-121-10675  E702   2042-00  2-0 S OF A1      2-0 W OF AA      21399   A833
  A685    C-0S1531                              2047-06  7-2 N OF A8      AJ               -----   N/A                                  NCR 1SN3779C
  A686    C-0S1531                              2047-06  7-2 N OF A8      AK               -----   N/A                                  NCR 1SN3777C
  A687    C-0S1531                              2047-06  A8               AJ               21399   INACCESSIBLE                         NCR 1SN3779C
  A688    C-0S1531                              2047-06  6-0 N OF A8      AJ               -----   N/A                                  NCR 1SN3777C
  A689    C-0S1532                              2047-06  7-4 S OF A10.9   11-2 E OF AF6    -----   N/A                                  FAB REQ. 717
  A690    C-0S1241  C-121-10657  FW834  1985-00  A3.1             2-6 W OF AE      -----   N/A                                  FAB REQ. C-1050
  A691    C-0S1241  C-121-10657  FW834  1985-00  A3               2-6 W OF AE      -----   N/A                                  FAB REQ. C-1050
  AA      C-0S1231  C-121-00976  E202   1988-00  2-0 N OF A14     AJ               20568   A005                                 SAME AS A406
  AB      C-0S1411  C-121-00165  E205   2026-00  1-0 N OF A14     10-8 W OF AL     20568   A002/A003                            SAME AS A002
  AC      C-0S1452  C-121-10675  E702   2037-06  8-9 S OF A2      1-0 W OF AA      20568   A006/A007
  AD      C-0S1511  C-121-01636  E501   2047-02  1-0 N OF A14     8-4 E OF AL      20568   A004
  AE      C-0S1521  C-121-00912  E401   2047-06  1-0 S OF A1      AK               20568   A001                                 SAME AS A037
  AF      C-0S1531  C-121-00629  E502   2047-06  1-0 N OF A14     AJ               20495   A008
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.DATE 27 DEC 84  17:31:23  RID       1    01 DEC 84  BECHTEL
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*                          STRUCTURAL JOINTS TRACKING                      AWS WELDING REPORT, APPENDIX A, PAGE 15
*         BECHTEL
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 R001   C-0S2411  C-121-08504  E101                                                21170   R089/R090
 R002   C-0S2411  C-121-08504  E101                                                21170   R091
 R003   C-0S2411  C-121-08504  E101                                                21170   R092
 R004   C-0S2411  C-121-08504  E101                                                21170   R121
 R005   C-0S2411  C-121-08504  E101                                                21170   R093
 R006   C-0S2411  C-121-08504  E101                                                21170   R122
 R007   C-0S2411  C-121-08504  E101                                                21170   R094/R095
 R008   C-0S2411  C-121-08504  E101                                                21170   R096
 R009   C-0S2411  C-121-08504  E101                                                21170   R097/R098
 R010   C-0S2411  C-121-08506  E102                                                21078   R099/R100
 R011   C-0S2411  C-121-08506  E102                                                21078   R101/R102
 R012   C-0S2411  C-121-08506  E102                                                21078   R103/R014                 SAME AS RB
 R013   C-0S2411  C-121-08606  E102                                                21375   R621
 R014   C-0S2411  C-121-08506  E102                                                21078   R105/R106
 R015   C-0S2411  C-121-08506  E102                                                21078   R107
 R016   C-0S2421  C-121-13001  E103                                                21080   R123/R124/R125
 R017   C-0S2421  C-121-13001  E103                                                21080   R126
 R018   C-0S2421  C-121-13001  E103                                                21080   R127
 R019   C-0S2421  C-121-13001  E103                                                21080   R128
 R020   C-0S2421  C-121-13001  E103                                                21406   R637
 R021   C-0S2511  C-121-08908  E105                                                21406   R645/R646
 R022   C-0S2511  C-121-08908  E105                                                21406   R638/R639
 R023   C-0S2511  C-121-08908  E105                                                21406   R649
 R024   C-0S2511  C-121-08908  E105                                                21406   R650/R651
 R025   C-0S2511  C-121-08908  E105                                                21406   R644
 R026   C-0S2511  C-121-08908  E105                                                -----   INACCESSIBLE
 R027   C-0S2511  C-121-08577  E106                                                -----   INACCESSIBLE
 R028   C-0S2511  C-121-08577  E106                                                -----   INACCESSIBLE
 R029   C-0S2511  C-121-08577  E106                                                -----   INACCESSIBLE
 R030   C-0S2511  C-121-08577  E106                                                21116   R108/R109/R110/R111
 R031   C-0S2511  C-121-08577  E106                                                21116   R113
 R032   C-0S2511  C-121-08577  E106                                                21116   R170
 R033   C-0S2511  C-121-08577  E106                                                21116   R171
 R034   C-0S2521  C-121-08576  E108                                                21117   R137/R138
 R035   C-0S2521  C-121-08576  E108                                                21117   R139/R140
 R036                                                                              -----   N/A                       NCR 1SN2793C
 R037   C-0S2521  C-121-08576  E108                                                21117   R141/R142/R143
 R038   C-0S2521  C-121-08576  E108                                                21072   R144/R145/R146
 R039   C-0S2611  C-121-13093  E109                                                21072   R114/R115
 R040   C-0S2611  C-121-13093  E109                                                21072   R116
 R041   C-0S2611  C-121-13093  E109                                                21072   R117
 R042   C-0S2611  C-121-13093  E109                                                21072   R118                      SAME AS RE
 R043   C-0S2611  C-121-13093  E109                                                21072   R129
 R044   C-0S2611  C-121-13093  E109                                                21078   R131
 R045   C-0S2611  C-121-13093  E109                                                21072   R119
 R046   C-0S2611  C-121-13093  E109                                                21072   R132/R133/R169
 R047   C-0S2611  C-121-13093  E109                                                21072   R134
 R048   C-0S2621  C-121-08523  E111                                                21077   R120
 R049   C-0S2621  C-121-08523  E111                                                21077   R135/R136
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*JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R050	C-0S2311	C-121-08549	E601			21085	R245/R246/R247/R248
R051	C-0S2311	C-121-08549	E601			21085	R249/R250/R251
R052	C-0S2311	C-121-08549	E601			21073	R252/R253
R053	C-0S2311	C-121-08549	E601			21085	R254/R255/R256
R054	C-0S2311	C-121-08549	E601			21085	R257/R258/R259/R260
R055	C-0S2311	C-121-08549	E601			21085	R261/R262/R263
R056	C-0S2311	C-121-08549	E601			21085	R264/R265/R266/R267
R057	C-0S2311	C-121-08549	E601			21085	R268/R269/R270/R271
R058	C-0S2311	C-121-08549	E601			-----	N/A
R059	C-0S2311	C-121-08786	E604			21076	R272/R273/R274/R275
R060	C-0S2311	C-121-08786	E604			21074	R276/R277
R061	C-0S2311	C-121-08786	E604			-----	N/A
R062	C-0S2311	C-121-08786	E604			-----	N/A
R063	C-0S2311	C-121-08786	E604			-----	N/A
R064	C-0S2311	C-121-08786	E604			-----	N/A
R065	C-0S2311	C-121-08887	E605			-----	N/A
R066	C-0S2311	C-121-08887	E605			-----	N/A
R067	C-0S2311	C-121-08887	E605			-----	N/A
R068	C-0S2311	C-121-08887	E605			-----	N/A
R069	C-0S2311	C-121-08887	E605			21084	R278/R279
R070	C-0S2311	C-121-08887	E605			21084	R280/R281
R071	C-0S2311	C-121-08887	E605			21084	R282
R072	C-0S2311	C-121-08887	E605			21084	R283/R284
R073	C-0S2312	C-121-08982	E610			21075	R177
R074	C-0S2312	C-121-08982	E610			21075	R178
R075	C-0S2312	C-121-08982	E610			-----	N/A
R076	C-0S2312	C-121-08982	E610			-----	N/A
R077	C-0S2411	C-121-08504	E101			21170	R179
R078	C-0S2411	C-121-08504	E101			21170	R180/R181
R079	C-0S2411	C-121-08504	E101			21170	R182/R183
R080	C-1S2313	C-0X-2905				-----	N/A
R081	C-0S2904	C-121-08543	E124			21170	R298
R082	C-0S2904	C-121-08543	E124			21170	R299
R083	C-1S2313	C-0X-2905				-----	N/A
R084	C-1S2313	C-0X-2905				-----	N/A
R085	C-0S2904	C-121-08543	E124			21170	R300
R086	C-0S2904	C-121-08543	E124			21170	R301
R087	C-0S2904	C-121-08543	E124			21170	R302
R088	C-0S2904	C-121-08543	E124			21170	R303
R089	C-0S2421	C-121-08510	E104			21081	R210/R211
R090	C-0S2421	C-121-08510	E104			21081	R212
R091	C-0S2421	C-121-08510	E104			21081	R213
R092	C-0S2421	C-121-08510	E104			21081	R214
R093	C-0S2421	C-121-08510	E104			21081	R215
R094	C-0S2421	C-121-08510	E104			21081	R216
R095	C-0S2421	C-121-08510	E104			21081	R217
R096	C-0S2421	C-121-08510	E104			21081	R219/R221
R097	C-0S2421	C-121-08510	E104			21081	R222/R223
R098	C-0S2421	C-121-08510	E104			-----	N/A
R099	C-0S2421	C-121-08510	E104			21081	R224/R226/R227
R100	C-0S2421	C-121-13001	E103			-----	N/A

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.	
R101	C-0S2421	C-121-13001	E103			21080	R232	
R102	C-0S2421	C-121-13001	E103			21080	R233/R234	
R103	C-0S2421	C-121-13001	E103			21080	R235/R236	
R104	C-0S2421	C-121-13001	E103			21080	R237	
R105	C-0S2421	C-121-13258	FW14			-----	N/A	
R106	C-0S2511	C-121-08909	E105			21076	R317	
R107	C-0S2511	C-121-08909	E105			-----	N/A	
R108	C-0S2511	C-121-08909	E105			21076	R315/R316	
R109	C-0S2511	C-121-08909	E105			21096	R318	
R110	C-0S2511	C-121-08577	E106			21116	R307	
R111	C-0S2511	C-121-08577	E106			-----	VOID	SAME AS R139
R112	C-0S2511	C-121-08577	E106			-----	VOID	BOLTED
R113	C-0S2511	C-121-08577	E106			21116	R304/R305	
R114	C-0S2511	C-121-08577	E106			21116	R308	
R115	C-0S2511	C-121-08577	E106			21116	R309	
R116	C-0S2511	C-121-08577	E106			21116	R310	
R117	C-0S2511	C-121-08577	E106			21116	R311	
R118	C-0S2511	C-121-08577	E106			21116	R312	
R119	C-0S2511	C-121-08577	E106			21116	R313	
R120	C-0S2511	C-121-08577	E106			21116	R314	
R121	C-0S2521	C-121-08912	E107			-----	N/A	
R122	C-0S2521	C-121-08912	E107			-----	N/A	
R123	C-0S2521	C-121-08912	E107			-----	N/A	
R124	C-0S2521	C-121-08912	E107			-----	N/A	
R125	C-0S2521	C-121-08912	E107			-----	N/A	
R126	C-0S2521	C-121-08912	E107			21115	R319/R320/R321	
R127	C-0S2521	C-121-08912	E107			21115	R322/R323/R358	
R128	C-0S2521	C-121-08912	E107			21115	R324	
R129	C-0S2521	C-121-08912	E107			21115	R325/R325	
R130	C-0S2521	C-121-08912	E107			21115	R330/R331	
R131	C-0S2521	C-121-08912	E107			-----	N/A	
R132	C-0S2521	C-121-08912	E107			21115	R332	
R133	C-0S2521	C-121-08912	E107			21115	R333	
R134	C-0S2521	C-121-13069	E125			21089	R194	
R135	C-0S2521	C-121-13069	E125			21089	R195	
R136	C-0S2521	C-121-13069	E125			21089	R196	
R137	C-0S2521	C-121-13069	E125			21089	R197	
R138	C-0S2521	C-121-13069	E125			21089	R198	
R139	C-0S2521	C-121-13069	E125			21089	R199	
R140	C-0S2521	C-121-13069	E125			21089	R200	
R141	C-0S2521	C-121-13069	E125			21089	R201	
R142	C-0S2521	C-121-13069	E125			21089	R202	
R143	C-0S2521	C-121-13069	E125			21089	R203	
R144	C-0S2521	C-121-13069	E125			21089	R205	
R145	C-0S2521	C-121-13069	E125			21089	R206	
R146	C-0S2521	C-121-13069	E125			21089	R207	
R147	C-0S2521	C-121-13069	E125			21089	R208	
R148	C-0S2521	C-121-13069	E125			21089	R209	
R149	C-0S2521	C-121-08576	E108			21117	R334	
R150	C-0S2521	C-121-08576	E108			21117	R332	
R151	C-0S2521	C-121-08576	E108			21117	R333	

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 *                               STRUCTURAL JOINTS TRACKING
 *        BECHTEL
 *JOINT . DRAWING .  ERECTION  .DRAW  .ELEVATON. ---------- LOCATION ----------- :  NCR  :   EVALUATION NO.
 *======.========.===========.======.========.================.================.=======.============================================.
  R152    C-0S2521  C-121-08576  E108                                               21117   R334/R335
  R153    C-0S2521  C-121-08576  E108                                               21117   R336
  R154    C-0S2521  C-121-08576  E108                                               21117   R337/R338
  R155    C-0S2521  C-121-08576  E108                                               -----   VOID                      BEAM DELETED
  R156    C-0S2521  C-121-08576  E108                                               -----   VOID                      BEAM DELETED
  R157    C-0S2521  C-121-08576  E108                                               21117   R339/R340
  R158    C-0S2521  C-121-08576  E108                                               21117   R341
  R159    C-0S2521  C-121-08576  E108                                               21117   R342
  R160    C-0S2521  C-121-08576  E108                                               21117   R343/R344
  R161    C-0S2611  C-121-13093  E109                                               21072   R188/R189
  R162    C-0S2611  C-121-13093  E109                                               21072   R190
  R163    C-0S2611  C-121-13093  E109                                               21072   R191/R192
  R164    C-0S2611  C-121-13093  E109                                               21072   R193
  R165    C-0S2611  C-121-08625  E110                                               21082   R184/R185/R186
  R166    C-0S2611  C-121-08625  E110                                               21082   R187
  R167    C-0S2621  C-121-08523  E111                                               21077   R173/R174/R571
  R168    C-0S2621  C-121-08523  E111                                               21077   R175/R176
  R169    C-0S2904  C-121-08543  E124                                               20509   R671
  R170    C-0S2904  C-121-08543  E124                                               20509   R672
  R171    C-0S2904  C-121-08543  E124                                               20509   R673
  R172    C-0S2904  C-121-08543  E124                                               20509   R674
  R173    C-0S2904  C-121-08543  E124                                               21290   R296/R297
  R174    C-0S2904  C-121-08543  E124                                               20509   R675
  R175    C-0S2904  C-121-08543  E124                                               -----   INACCESSIBLE
  R176    C-0S2904  C-121-08543  E124                                               -----   INACCESSIBLE
  R177    C-0S2411  C-121-08506  E102                                               21078   R236/R237
  R178    C-0S2411  C-121-08506  E102                                               21078   R240/R241
  R179    C-0S2411  C-121-08506  E102                                               21078   R242
  R180    C-0S2311  C-0X-2901                                                       -----   N/A
  R181    C-0S2311  C-0X-2901                                                       -----   N/A
  R182    C-0S2311  C-0X-2901                                                       -----   N/A
  R183    C-0S2311  C-0X-2901                                                       -----   N/A
  R184    C-0S2311  C-0X-2901                                                       -----   N/A
  R185    C-0S2311  C-0X-2901                                                       -----   N/A
  R186    C-0S2311  C-0X-2901                                                       -----   N/A
  R187    C-0S2311  C-0X-2901                                                       -----   N/A
  R188    C-0S2311  C-0X-2901                                                       -----   N/A
  R189    C-0S2311  C-0X-2901                                                       -----   N/A
  R190    C-0S2311  C-0X-2901                                                       -----   N/A
  R191    C-0S2311  C-0X-2901                                                       -----   N/A
  R192    C-0S2311  C-0X-2901                                                       -----   N/A
  R193    C-0S2311  C-0X-2902                                                       -----   N/A
  R194    C-0S2311  C-0X-2902                                                       -----   N/A
  R195    C-0S2311  C-0X-2902                                                       21375   INACCESSIBLE
  R196    C-0S2311  C-0X-2902                                                       -----   N/A
  R197    C-0S2311  C-0X-2902                                                       -----   N/A
  R198    C-0S2311  C-0X-2902                                                       -----   N/A
  R199    C-0S2311  C-0X-2902                                                       21375   INACCESSIBLE
  R200    C-0S2311  C-0X-2902                                                       21375   INACCESSIBLE
  R201    C-0S2311  C-0X-2902                                                       -----   N/A
  R202    C-0S2311  C-0X-2902                                                       -----   N/A
```

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R203	C-0S2311	C-0X-2902				-----	N/A
R204	C-0S2311	C-0X-2902				21077	R345
R205	C-0S2311	C-0X-2902				-----	N/A
R206	C-0S2311	C-0X-2902				-----	N/A
R207	C-0S2311	C-0X-2902				-----	N/A
R208	C-0S2311	C-0X-2902				-----	N/A
R209	C-0S2311	C-0X-2902				-----	N/A
R210	C-0S2311	C-0X-2902				-----	N/A
R211	C-0S2311	C-0X-2902				-----	N/A
R212	C-0S2311	C-0X-2902				21375	N/A
R213	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R214	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R215	C-0S2311	C-0X-2902				-----	N/A
R216	C-0S2311	C-0X-2902				-----	N/A
R217	C-0S2311	C-0X-2902				-----	N/A
R218	C-0S2311	C-0X-2902				-----	N/A
R219	C-0S2311	C-0X-2902				-----	N/A
R220	C-0S2311	C-0X-2902				-----	N/A
R221	C-0S2311	C-0X-2902				-----	N/A
R222	C-0S2311	C-0X-2902				21083	R574
R223	C-0S2311	C-0X-2902				21083	R346
R224	C-0S2311	C-0X-2902				21375	N/A
R225	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R226	C-0S2311	C-0X-2902				21375	N/A
R227	C-0S2311	C-0X-2902				21375	R635
R228	C-0S2311	C-0X-2902				-----	N/A
R229	C-0S2311	C-0X-2902				-----	N/A
R230	C-0S2311	C-0X-2902				-----	N/A
R231	C-0S2311	C-0X-2902				-----	N/A
R232	C-0S2311	C-0X-2902				-----	N/A
R233	C-0S2311	C-0X-2902				-----	N/A
R234	C-0S2311	C-0X-2902				-----	N/A
R235	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R236	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R237	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R238	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R239	C-0S2311	C-0X-2902				21375	INACCESSIBLE
R240	C-0S2311	C-0X-2902				21375	R575
R241	C-0S2311	C-0X-2902				-----	N/A
R242	C-0S2311	C-0X-2902				21375	R576
R243	C-0S2311	C-0X-2902				21375	R577
R244	C-0S2311	C-0X-2902				21083	R578
R245	C-0S2311	C-0X-2902				21375	R579
R246	C-0S2311	C-0X-2902				21375	R580
R247	C-0S2311	C-0X-2902				-----	R581
R248	C-0S2311	C-0X-2902				21083	R582
R249	C-0S2311	C-0X-2902				-----	N/A
R250	C-0S2311	C-0X-2902				-----	N/A
R251	C-0S2311	C-0X-2902				-----	N/A
R252	C-0S2311	C-0X-2902				21083	R347
R253	C-0S2311	C-0X-2902				21375	R583

JOINT	BECHTEL DRAWING	ERECTION DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R254	C-0S2311	C-0X-2902			21375	R584
R255	C-0S2311	C-0X-2902			21375	INACCESSIBLE
R256	C-0S2902	C-0X-2904			------	N/A
R257	C-0S2902	C-0X-2904			------	N/A
R258	C-0S2902	C-0X-2904			------	N/A
R259	C-0S2902	C-0X-2904			------	N/A
R260	C-0S2902	C-0X-2904			------	N/A
R261	C-0S2902	C-0X-2904			------	N/A
R262	C-0S2902	C-0X-2904			------	N/A
R263	C-1S2313	C-0X-2905			------	N/A
R264	C-1S2313	C-0X-2905			------	N/A
R265	C-1S2313	C-0X-2905			------	N/A
R266	C-1S2313	C-0X-2905			------	N/A
R267	C-1S2313	C-0X-2905			------	N/A
R268	C-1S2313	C-0X-2905			------	N/A
R269	C-1S2313	C-0X-2905			------	N/A
R270	C-1S2313	C-0X-2905			21375	R353
R271	C-1S2313	C-0X-2905			21375	R354
R272	C-1S2313	C-0X-2905			21375	R355
R273	C-1S2313	C-0X-2905			------	N/A
R274	C-1S2313	C-0X-2905			------	N/A
R275	C-1S2313	C-0X-2905			21375	R412
R276	C-1S2313	C-0X-2905			------	N/A
R277	C-1S2313	C-0X-2905			------	N/A
R278	C-1S2313	C-0X-2905			------	N/A
R279	C-1S2313	C-0X-2905			------	N/A
R280	C-1S2313	C-0X-2905			------	N/A
R281	C-1S2313	C-0X-2905			------	N/A
R282	C-1S2313	C-0X-2905			------	N/A
R283	C-1S2313	C-0X-2905			------	N/A
R284	C-1S2313	C-0X-2905			------	N/A
R285	C-1S2313	C-0X-2905			------	N/A
R286	C-1S2313	C-0X-2905			------	N/A
R287	C-1S2313	C-0X-2905			------	N/A
R288	C-1S2313	C-0X-2905			------	N/A
R289	C-1S2313	C-0X-2905			------	N/A
R290	C-1S2313	C-0X-2905			------	N/A
R291	C-1S2313	C-0X-2905			------	N/A
R292	C-1S2313	C-0X-2905			------	N/A
R293	C-1S2313	C-0X-2905			21377	N/A
R294	C-1S2313	C-0X-2905			21377	N/A
R295	C-1S2313	C-0X-2905			21377	N/A
R296	C-1S2313	C-0X-2905			21377	N/A
R297	C-1S2313	C-0X-2905			------	N/A
R298	C-1S2313	C-0X-2905			------	N/A
R299	C-1S2313	C-0X-2905			21377	N/A
R300	C-1S2313	C-0X-2905			21377	N/A
R301	C-1S2313	C-0X-2905			------	N/A
R302	C-1S2313	C-0X-2905			------	N/A
R303	C-1S2313	C-0X-2905			21377	N/A
R304	C-1S2313	C-0X-2905			21377	N/A

STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R305	C-1S2312	C-1X-2925				21406	N/A
R306	C-1S2312	C-1X-2925				21406	N/A
R307	C-1S2312	C-1X-2925				-----	N/A
R308	C-1S2312	C-1X-2925				-----	N/A
R309	C-1S2313	C-0X-2505				-----	N/A
R310	C-1S2313	C-0X-2905				-----	N/A
R311	C-1S2313	C-0X-2905				-----	N/A
R312	C-1S2313	C-0X-2905				-----	N/A
R313	C-1S2313	C-0X-2905				-----	N/A
R314	C-1S2313	C-0X-2905				-----	N/A
R315	C-1S2313	C-0X-2905				21377	N/A
R316	C-1S2313	C-0X-2905				21377	N/A
R317	C-1S2313	C-0X-2905				21377	N/A
R318	C-1S2313	C-1X-2950				-----	N/A
R319	C-0S2511	C-1X-2950				-----	N/A
R320	C-0S2511	C-1X-2950				-----	N/A
R321	C-0S2511	C-1X-2950				-----	N/A
R322	C-0S2511	C-1X-2950				-----	N/A
R323	C-0S2511	C-1X-2950				-----	N/A
R324	C-0S2511	C-1X-2750				21377	N/A
R325	C-0S2511	C-1X-2950				-----	N/A
R326	C-0S2314	C-0X-2912				-----	N/A
R327	C-0S2314	C-0X-2912				-----	N/A
R328	C-0S2314	C-0X-2912				-----	N/A
R329	C-0S2314	C-0X-2912				-----	N/A
R330	C-0S2314	C-0X-2912				-----	N/A
R331	C-0S2314	C-0X-2912				-----	N/A
R332	C-0S2314	C-0X-2912				-----	N/A
R333	C-0S2314	C-0X-2912				-----	N/A
R334	C-0S2314	C-0X-2912				-----	N/A
R335	C-0S2314	C-0X-2912				21114	R287
R336	C-0S2314	C-0X-2912				-----	N/A
R337	C-0S2314	C-0X-2912				-----	N/A
R338	C-0S2314	C-0X-2912				21114	R288
R339	C-0S2314	C-0X-2912				-----	N/A
R340	C-0S2314	C-0X-2912				-----	N/A
R341	C-0S2314	C-0X-2912				-----	N/A
R342	C-0S2314	C-0X-2912				-----	N/A
R343	C-0S2314	C-0X-2912				-----	N/A
R344	C-0S2314	C-0X-2912				-----	N/A
R345	C-0S2314	C-0X-2912				-----	N/A
R346	C-0S2314	C-0X-2912				-----	N/A
R347	C-0S2314	C-0X-2912				-----	N/A
R348	C-0S2314	C-0X 2912				-----	N/A
R349	C-0S2314	C-0X-2912				-----	N/A
R350	C-0S2314	C-0X-2912				-----	N/A
R351	C-0S2314	C-0X-2912				-----	N/A
R352	C-0S2314	C-0X-2912				-----	N/A
R353	C-0S2314	C-0X-2912				-----	N/A
R354	C-0S2314	C-0X-2912				-----	N/A
R355	C-0S2314	C-0X-2912				-----	N/A

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R356	C-0S2314	C-0X-2912				------	N/A
R357	C-0S2314	C-0X-2912				------	N/A
R358	C-0S2314	C-0X-2912				21114	N/A
R359	C-0S2314	C-0X-2912				------	N/A
R360	C-0S2314	C-0X-2912				------	N/A
R361	C-0S2314	C-0X-2912				------	N/A
R362	C-0S2314	C-0X-2912				21114	R290
R363	C-0S2314	C-0X-2912				21114	R271
R364	C-0S2314	C-0X-2912				------	N/A
R365	C-0S2314	C-0X-2912				------	N/A
R366	C-0S2314	C-0X-2912				------	N/A
R367	C-0S2314	C-0X-2912				------	N/A
R368	C-0S2314	C-0X-2912				------	N/A
R369	C-0S2314	C-0X-2912				------	N/A
R370	C-0S2314	C-0X-2912				21114	R292
R371	C-0S2314	C-0X-2912				------	N/A
R372	C-0S2314	C-0X-2912				------	N/A
R373	C-0S2314	C-0X-2912				------	N/A
R374	C-0S2314	C-0X-2912				------	N/A
R375	C-0S2314	C-0X-2912				------	N/A
R376	C-0S2314	C-0X-2912				------	N/A
R377	C-0S2314	C-0X-2912				------	N/A
R378	C-0S2314	C-0X-2912				------	N/A
R379	C-0S2314	C-0X-2912				------	N/A
R380	C-0S2314	C-0X-2912				------	N/A
R381	C-0S2314	C-0X-2912				------	N/A
R382	C-0S2314	C-0X-2912				------	N/A
R383	C-0S2314	C-0X-2912				------	N/A
R384	C-0S2314	C-0X-2912				------	N/A
R385	C-0S2314	C-0X-2912				------	N/A
R386	C-0S2314	C-0X-2912				------	N/A
R387	C-0S2314	C-0X-2912				------	N/A
R388	C-0S2314	C-0X-2912				21406	R620
R389	C-0S2314	C-0X-2912				------	N/A
R390	C-0S2314	C-0X-2912				------	N/A
R391	C-0S2314	C-0X-2912				------	N/A
R392	C-0S2314	C-0X-2912				------	N/A
R393	C-0S2314	C-0X-2912				------	N/A
R394	C-0S2314	C-0X-2912				------	N/A
R395	C-0S2314	C-0X-2912				21406	R619
R396	C-0S2314	C-0X-2912				------	N/A
R397	C-0S2314	C-0X-2912				------	N/A
R398	C-0S2314	C-0X-2912				------	N/A
R399	C-0S2314	C-0X-2912				------	N/A
R400	C-0S2314	C-0X-2912				------	N/A
R401	C-0S2314	C-0X-2912				------	N/A
R402	C-0S2314	C-0X-2912				------	N/A
R403	C-0S2314	C-0X-2912				------	N/A
R404	C-0S2314	C-0X-2912				------	N/A
R405	C-0S2314	C-0X-2912				------	N/A
R406	C-0S2314	C-0X-2912				21113	R293

F004530

STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R407	C-0S2314	C-0X-2912				------	N/A
R408	C-0S2314	C-0X-2912				------	N/A
R409	C-0S2314	C-0X-2912				------	N/A
R410	C-0S2314	C-0X-2912				------	N/A
R411	C-0S2314	C-0X-2912				------	N/A
R412	C-0S2314	C-0X-2912				------	N/A
R413	C-0S2314	C-0X-2912				------	N/A
R414	C-0S2314	C-0X-2912				------	N/A
R415	C-0S2314	C-0X-2912				------	N/A
R416	C-0S2314	C-0X-2912				21114	R294
R417	C-0S2314	C-0X-2912				21114	R295
R418	C-0S2314	C-0X-2912				------	N/A
R419	C-0S2314	C-0X-2912				------	N/A
R420	C-0S2314	C-0X-2912				------	N/A
R421	C-0S2314	C-0X-2912				------	N/A
R422	C-0S2314	C-0X-2912				21114	R296
R423	C-0S2314	C-0X-2912				------	N/A
R424	C-0S2314	C-0X-2912				------	N/A
R425	C-0S2314	C-0X-2912				------	N/A
R426	C-0S2314	C-0X-2912				------	N/A
R427	C-0S2314	C-0X-2912				------	N/A
R428	C-0S2314	C-0X-2912				------	N/A
R429	C-1S2313	C-0X-2905				------	N/A
R430	C-1S2313	C-0X-2905				------	N/A
R431	C-1S2313	C-0X-2905				------	N/A
R432	C-1S2313	C-0X-2905				------	N/A
R433	C-1S2313	C-0X-2905				------	N/A
R434	C-1S2313	C-0X-2905				------	N/A
R435	C-1S2313	C-0X-2905				21377	N/A
R436	C-1S2313	C-0X-2905				21377	N/A
R437	C-1S2313	C-0X-2905				------	N/A
R438	C-1S2313	C-0X-2905				------	N/A
R439	C-1S2313	C-0X-2905				------	N/A
R440	C-1S2313	C-0X-2905				------	N/A
R441	C-1S2313	C-0X-2905				------	N/A
R442	C-1S2313	C-0X-2905				------	N/A
R443	C-1S2313	C-0X-2905				------	N/A
R444	C-1S2313	C-0X-2905				21131	R356
R445	C-1S2313	C-0X-2905				------	N/A
R446	C-1S2313	C-0X-2705				------	N/A
R447	C-1S2313	C-0X-2905				------	N/A
R448	C-1S2313	C-0X-2905				------	N/A
R449	C-1S2313	C-0X-2905				------	N/A
R450	C-1S2313	C-0X-2905				------	N/A
R451	C-1S2313	C-0X-2905				------	N/A
R452	C-1S2313	C-0X-2705				------	N/A
R453	C-1S2313	C-0X-2905				------	N/A
R454	C-1S2313	C-0X-2905				------	N/A
R455	C-1S2313	C-0X-2905				------	N/A
R456	C-1S2313	C-0X-2905				21131	R357
R457	C-1S2313	C-0X-2905				------	N/A

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R458	C-1S2313	C-0X-2905				-----	N/A
R459	C-1S2313	C-0X-2905				-----	N/A
R460	C-1S2313	C-0X-2905				-----	N/A
R461	C-1S2313	C-0X-2905				-----	N/A
R462	C-0S2315	C-0X-2914				-----	N/A
R463	C-0S2315	C-0X-2914				-----	N/A
R464	C-0S2315	C-0X-2914				-----	N/A
R465	C-0S2315	C-0X-2914				-----	N/A
R466	C-0S2315	C-0X-2914				-----	N/A
R467	C-0S2315	C-0X-2914				-----	N/A
R468	C-0S2315	C-0X-2914				-----	N/A
R469	C-0S2315	C-0X-2914				-----	N/A
R470	C-0S2315	C-0X-2914				-----	N/A
R471	C-0S2315	C-0X-2914				-----	N/A
R472	C-0S2315	C-0X-2914				-----	N/A
R473	C 0S2315	C-0X-2914				-----	N/A
R474	C-0S2315	C-0X-2914				-----	N/A
R475	C-0S2315	C-0X-2914				-----	N/A
R476	C-0S2315	C-0X-2914				-----	N/A
R477	C-0S2315	C-0X-2914				-----	N/A
R478	C-0S2315	C-0X-2914				-----	N/A
R479	C-0S2315	C-0X-2914				21289	R348/R357
R480	C-0S2315	C-0X-2914				-----	N/A
R481	C-0S2315	C-0X-2914				-----	N/A
R482	C-0S2315	C-0X-2914				-----	N/A
R483	C-0S2315	C-0X-2914				-----	N/A
R484	C-0S2315	C-0X-2914				-----	N/A
R485	C-0S2315	C-0X-2914				-----	N/A
R486	C-0S2315	C-0X-2914				-----	N/A
R487	C-0S2315	C-0X-2914				-----	N/A
R488	C-0S2315	C-0X-2914				-----	N/A
R489	C-0S2315	C-0X-2914				-----	N/A
R490	C-0S2315	C-0X-2914				-----	N/A
R491	C-0S2315	C 0X-2914				-----	N/A
R492	C-0S2315	C-0X-2914				-----	N/A
R493	C 0S2315	C-0X 2914				-----	N/A
R494	C-0S2315	C-0X-2914				-----	N/A
R495	C-0S2315	C-0X-2914				-----	N/A
R496	C-0S2315	C-0X-2914				-----	N/A
R497	C-0S2315	C-0X-2914				-----	N/A
R498	C-0S2315	C-0X-2914				-----	N/A
R499	C-0S2315	C-0X-2914				-----	N/A
R500	C-0S2315	C-0X-2914				-----	N/A
R501	C-0S2315	C-0X-2914				21289	R349
R502	C-0S2315	C-0X-2914				-----	N/A
R503	C-0S2315	C-0X-2914				-----	N/A
R504	C-0S2315	C-0X-2914				-----	N/A
R505	C-0S2315	C-0X-2914				-----	VOID NO WELD REQUIRED
R506	C-0S2315	C-0X-2914				-----	N/A
R507	C-0S2315	C-0X-2914				-----	N/A
R508	C-0S2315	C-0X-2914				-----	N/A

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STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.	
R509	C-0S2315	C-0X-2914				-----	N/A	
R510	C-0S2315	C-0X-2914				-----	N/A	
R511	C-0S2315	C-0X-2916				-----	N/A	
R512	C-0S2315	C-0X-2914				-----	N/A	
R513	C-0S2315	C-0X-2914				71284	R351	
R514	C-0S2315	C-0X-2914				-----	N/A	
R515	C-0S2315	C-0X-2914				-----	N/A	
R516	C-0S2315	C-0X-2914				-----	N/A	
R517	C-0S2315	C-0X-2914				-----	N/A	
R518	C-0S2315	C-0X-2914				-----	N/A	
R519	C-0S2315	C-0X-2914				-----	N/A	
R520	C-0S2315	C-0X-2914				-----	N/A	
R521	C-0S2315	C-0X-2914				-----	N/A	
R522	C-0S2315	C-0X-2914				-----	N/A	
R523	C-0S2315	C-0X-2914				-----	N/A	
R524	C-0S2315	C-0X-2914				-----	N/A	
R525	C-0S2315	C-0X-2914				-----	VOID	NO WELD REQUIRED
R526	C-0S2315	C-0X-2914				-----	N/A	
R527	C-0S2315	C-0X-2914				-----	N/A	
R528	C-0S2315	C-0X-2914				-----	N/A	
R529	C-0S2315	C-0X-2914				-----	N/A	
R530	C-0S2315	C-0X-2914				-----	N/A	
R531	C-0S2315	C-0X-2914				-----	N/A	
R532	C-0S2315	C-0X-2914				-----	N/A	
R533	C-0S2315	C-0X-2914				-----	N/A	
R534	C-0S2315	C-0X-2914				-----	N/A	
R535	C-0S2315	C-0X-2914				-----	N/A	
R536	C-0S2315	C-0X-2914				-----	N/A	
R537	C-0S2315	C-0X-2914				-----	N/A	
R538	C-0S2315	C-0X-2914				-----	N/A	
R539	C-0S2315	C-0X-2914				-----	N/A	
R540	C-0S2315	C-0X-2914				-----	N/A	
R541	C-0S2315	C-0X-2914				-----	N/A	
R542	C-0S2315	C-0X-2914				-----	N/A	
R543	C-0S2315	C-0X-2914				-----	N/A	
R544	C-0S2315	C-0X-2914				-----	N/A	
R545	C-0S2315	C-0X-2914				-----	N/A	
R546	C-0S2315	C-0X-2914				-----	N/A	
R547	C-0S2315	C-0X-2914				-----	N/A	
R548	C-0S2315	C-0X-2914				-----	N/A	
R549	C-0S2315	C-0X-2914				-----	N/A	
R550	C-0S2315	C-0X-2914				-----	N/A	
R551	C-0S2315	C-0X-2914				-----	N/A	
R552	C-0S2315	C-0X-2914				-----	N/A	
R553	C-0S2315	C-0X-2914				-----	N/A	
R554	C-0S2315	C-0X-2914				-----	N/A	
R555	C-0S2315	C-0X-2914				-----	N/A	
R556	C-0S2315	C-0X-2914				-----	N/A	
R557	C-0S2315	C-0X-2914				-----	N/A	
R558	C-0S2315	C-0X-2914				-----	N/A	
R559	C-0S2315	C-0X-2914				-----	N/A	

STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R560	C-0S2315	C-0X-2914				-----	N/A
R561	C-0S2315	C-0X-2914				-----	N/A
R562	C-0S2315	C-0X-2914				-----	N/A
R563	C-0S2315	C-0X-2914				-----	N/A
R564	C-0S2315	C-0X-2914				-----	N/A
R565	C-0S2315	C-0X-2914				-----	N/A
R566	C-0S2315	C-0X-2914				-----	N/A
R567	C-0S2315	C-0X-2914				-----	N/A
R568	C-0S2315	C-0X-2914				-----	N/A
R569	C-0S2315	C-0X-2914				-----	N/A
R570	C-0S2315	C-0X-2914				-----	N/A
R571	C-0S2311	C-0X-2902				-----	N/A
R572	C-0S2314	C-0X-2912				-----	N/A
R573	C-0C2902	C-131-05734	E6			-----	N/A
R574	C-0C2902	C-131-05734	E6			-----	N/A
R575	C-0C2902	C-131-05734	E6			-----	N/A
R576	C-0C2902	C-131-05734	E6			-----	N/A
R577	C-0C2902	C-131-05734	E6			-----	N/A
R578	C-0S2001	C-121-08367	E120			-----	N/A
R579	C-0S2001	C-121-08367	E120			-----	N/A
R580	C-0S2001	C-121-08367	E120			-----	N/A
R581	C-0S2001	C-121-08367	E120			-----	N/A
R582	C-0S2001	C-121-08367	E120			-----	N/A
R583	C-0S2001	C-121-08367	E120			-----	N/A
R584	C-0S2001	C-121-08367	E120			-----	N/A
R585	C-0S2001	C-121-08367	E120			21235	R437/R483
R586	C-0S2001	C-121-08367	E120			-----	N/A
R587	C-0S2001	C-121-08367	E120			-----	N/A
R588	C-0S2001	C-121-08367	E120			-----	N/A
R589	C-0S2001	C-121-08367	E120			-----	N/A
R590	C-0S2021	C-121-08950	E501			-----	N/A
R591	C-0S2021	C-121-08950	E501			-----	N/A
R592	C-0S2021	C-121-08950	E501			-----	N/A
R593	C-0S2021	C-121-08950	E501			-----	N/A
R594	C-1S2312	C-1X-2925				-----	N/A
R595	C-1S2312	C-1X-2925				21271	R666
R596	C-1S2312	C-1X-2925				21291	R664/R665
R597	C-1S2312	C-1X-2925				21271	R665
R598	C-1S2312	C-1X-2925				21291	R662
R599	C-1S2312	C-1X-2925				-----	N/A
R600	C-1S2312	C-1X-2925				21291	R668
R601	C-1S2312	C-1X-2925				21291	R661
R602	C-0S2511	C-121-13017	FW205			-----	N/A
R603	C-0S2511	C-121-13017	FW205			21206	R381
R604	C-0S2611	C-121-08999	FW1			21375	R653
R605	C-0S2611	C-121-08999	FW1			21375	R434
R606	C-0S2611	C-121-08999	FW1			21375	R654
R607	C-0S2611	C-121-08999	FW1			21375	R435
R608	C-0S2611	C-121-08999	FW1			-----	N/A
R609	C-0S2611	C-121-08999	FW1			-----	N/A
R610	C-0S2611	C-121-08999	FW1			-----	N/A

STRUCTURAL JOINTS-TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R611	C-0S2611	C-121-08999	FW1			------	N/A
R612	C-0S2611	C-121-08999	FW1			21299	R486/R487
R613	C-0S2611	C-121-08999	FW1			21299	R488
R614	C-0S2611	C-121-08999	FW1			21299	489
R615	C-0S2611	C-121-08999	FW1			21299	R490
R616	C-0S2611	C-121-08999	FW1			21299	R491
R617	C-0S2611	C-121-08999	FW1			21299	R492
R618	C-0S2611	C-121-08999	FW1			21299	R493
R619	C-0S2611	C-121-08999	FW1			21299	R655
R620	C-0S2611	C-121-08999	FW1			21375	R656
R621	C-0S2611	C-121-08999	FW1			21375	R494
R622	C-0S2611	C-121-08999	FW1			21375	R657
R623	C-0S2611	C-121-08999	FW1			21375	R505
R624	C-0S2611	C-121-08999	FW1			------	N/A
R625	C-0S2611	C-121-08999	FW1			------	N/A
R626	C-0S2611	C-121-08999	FW1			------	N/A
R627	C-0S2611	C-121-08999	FW1			21299	R495
R628	C-0S2611	C-121-08999	FW1			21299	R496
R629	C-0S2611	C-121-08999	FW1			21299	R497
R630	C-0S2611	C-121-08999	FW1			21299	R498/R499
R631	C-0S2611	C-121-08999	FW1			21299	R500
R632	C-0S2611	C-121-08999	FW1			21299	R501
R633	C-0S2611	C-121-08999	FW1			21299	R502
R634	C-0S2611	C-121-08999	FW1			21299	R503
R635	C-0S2611	C-121-08999	FW1			21299	R504
R636	C-0S2611	C-121-13098	FW301			21207	R382
R637	C-0S2611	C-121-13098	FW301			21375	R624
R638	C-0S2611	C-121-13098	FW301			21375	R625
R639	C-0S2611	C-121-13098	FW301			21207	R383
R640	C-0S2611	C-121-13098	FW301			------	N/A
R641	C-0S2611	C-121-13098	FW301			------	N/A
R642	C-0S2611	C-121-13098	FW301			21375	R626
R643	C-0S2611	C-121-13099	FW302			------	N/A
R644	C-0S2611	C-121-13099	FW302			21242	R450
R645	C-0S2611	C-121-13099	FW302			21242	R449
R646	C-0S2611	C-121-13099	FW302			------	N/A
R647	C-0S2611	C-121-13099	FW302			------	N/A
R648	C-0S2611	C-121-13099	FW302			------	N/A
R649	C-0S2611	C-121-13099	FW302			------	N/A
R650	C-0S2611	C-121-08625	E110			------	N/A
R651	C-0S2611	C-121-08625	E110			------	N/A
R652	C-0S2611	C-121-08625	E110			------	N/A
R653	C-0S2914	C-121-08846	E606			------	N/A
R654	C-0S2914	C-121-08846	E606			------	N/A
R655	C-0S2914	C-121-08846	E606			21209	R373
R656	C-0S2914	C-121-08846	E606			21209	R374
R657	C-0S2914	C-121-08846	E606			21209	R375
R658	C-0S2914	C-121-08846	E606			21209	R376
R659	C-0S2914	C-121-08846	E606			21209	R377
R660	C-0S2914	C-121-08846	E606			21209	R378
R661	C-0S2914	C-121-08846	E606			21209	R379

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STRUCTURAL JOINTS TRACKING

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R662	C-0S2914	C-121-08846	E606			-----	N/A
R663	C-0S2919	C-121-08752	E602			-----	N/A
R664	C-0S2919	C-121-08752	E602			-----	N/A
R665	C-0S2919	C-121-08752	E602			21223	R435
R666	C-0S2919	C-121-08752	E602			21223	R436
R667	C-0S2919	C-121-08753	E603			21222	R429
R668	C-0S2919	C-121-08753	E603			-----	N/A
R669	C-0S2919	C-121-08753	E603			-----	N/A
R670	C-0S2919	C-121-08753	E603			-----	N/A
R671	C-0S2919	C-121-08753	E603			-----	N/A
R672	C-0S2919	C-121-08753	E603			-----	N/A
R673	C-0S2919	C-121-08753	E603			-----	N/A
R674	C-0S2919	C-121-08753	E603			-----	N/A
R675	C-0S2919	C-121-08753	E603			-----	N/A
R676	C-0S2919	C-121-08753	E603			-----	N/A
R677	C-0S2919	C-121-08753	E603			-----	N/A
R678	C-0S2919	C-121-08753	E603			-----	N/A
R679	C-0S2919	C-121-08753	E603			-----	N/A
R680	C-0S2919	C-121-08753	E603			21222	R430
R681	C-0S2919	C-121-08753	E603			21222	R431
R682	C-0S2919	C-121-08753	E603			-----	N/A
R683	C-0S2919	C-121-08753	E603			-----	N/A
R684	C-0S2919	C-121-08753	E603			-----	N/A
R685	C-0S2919	C-121-08753	E603			21222	R432
R686	C-0S2919	C-121-08753	E603			-----	N/A
R687	C-0S2919	C-121-08753	E603			-----	N/A
R688	C-0S2919	C-121-08753	E603			-----	N/A
R689	C-0S2919	C-121-08753	E603			-----	N/A
R690	C-0S2919	C-121-08753	E603			21222	R433
R691	C-0S2919	C-121-08753	E603			21222	R434
R692	C-0S2919	C-121-08753	E603			-----	N/A
R693	C-0S2919	C-121-08753	E603			-----	N/A
R694	C-0S2919	C-121-08753	E603			-----	N/A
R695	C-0S2919	C-121-08753	E603			-----	N/A
R696	C-0S2919	C-121-08753	E603			-----	N/A
R697	C-0S2919	C-121-08753	E603			-----	N/A
R698	C-0S2919	C-121-08753	E603			-----	N/A
R699	C-0S2919	C-121-08753	E603			-----	N/A
R700	C-0S2919	C-121-08753	E603			-----	N/A
R701	C-0S2936	C-131-05759	E13			21193	R388
R702	C-0S2936	C-131-05759	E13			21193	R389
R703	C-0S2936	C-131-05759	E13			21193	R390
R704	C-0S2936	C-131-05759	E13			21193	R391
R705	C-0S2936	C-131-05759	E13			21193	R392/R397
R706	C-0S2936	C-131-05759	E13			21193	R393/R398
R707	C-0S2936	C-131-05759	E13			21193	R394
R707	C-0S2936	C-131-05759	E13			21193	R395/R399
R709	C-0S2936	C-131-05759	E13			21193	R396/R400
R710	C-0S2937	C-131-05800	E4			-----	N/A
R711	C-0S2937	C-131-05800	E4			-----	N/A
R712	C-0S2937	C-131-05800	E4			-----	N/A

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R713	C-0S2937	C-131-05800	E4			-----	N/A
R714	C-0S2937	C-131-05800	E4			-----	N/A
R715	C-0S2937	C-131-05800	E4			-----	N/A
R716	C-0S2937	C-131-05800	E4			-----	N/A
R717	C-0S2937	C-131-05800	E4			-----	N/A
R718	C-0S2937	C-131-05800	E4			-----	N/A
R719	C-0S2937	C-131-05800	E4			-----	N/A
R720	C-0S2937	C-131-05800	E4			-----	N/A
R721	C-0S2937	C-131-05800	E4			-----	N/A
R722	C-0S2937	C-131-05800	E4			-----	N/A
R723	C-0S2937	C-131-05800	E4			-----	N/A
R724	C-0S2937	C-131-05800	E4			-----	N/A
R725	C-0S2937	C-131-05800	E4			-----	N/A
R726	C-0S2937	C-131-05800	E4			-----	N/A
R727	C-0S2937	C-131-05800	E4			-----	N/A
R728	C-0S2937	C-131-05800	E4			-----	N/A
R729	C-0S2937	C-131-05800	E4			-----	N/A
R730	C-0S2937	C-131-05800	E4			-----	N/A
R731	C-0S2937	C-131-05800	E4			-----	N/A
R732	C-0S2937	C-131-05800	E4			-----	N/A
R733	C-0S2937	C-131-05800	E4			-----	N/A
R734	C-0S2937	C-131-05800	E4			-----	N/A
R735	C-0S2937	C-131-05800	E4			-----	N/A
R736	C-0S2919	C-121-08772	E608			-----	N/A
R737	C-0S2919	C-121-08772	E608			-----	N/A
R738	C-0S2919	C-121-08772	E608			21286	R506
R739	C-0S2919	C-121-08772	E608			21286	R507
R740	C-0S2919	C-121-08772	E608			21286	R508
R741	C-0S2919	C-121-08772	E608			21286	R509
R742	C-0S2919	C-121-08772	E608			21286	R510
R743	C-0S2919	C-121-08772	E608			21286	R511
R744	C-0S2919	C-121-08772	E608			21286	R512
R745	C-0S2919	C-121-08772	E608			21286	R513
R746	C-0S2924	C-121-08773	E609			-----	N/A
R747	C-0S2924	C-121-08773	E609			21197	R380
R748	C-0S2924	C-121-08773	E609			-----	N/A
R749	C-0S2924	C-121-08773	E609			-----	N/A
R750	C-0S2924	C-121-08773	E609			-----	N/A
R751	C-0S2924	C-121-08773	E609			-----	N/A
R752	C-0S2924	C-121-08773	E609			-----	N/A
R753	C-0S2924	C-121-08773	E609			-----	N/A
R754	C-0S2924	C-121-08773	E609			-----	N/A
R755	C-0S2924	C-121-08773	E609			-----	N/A
R756	C-0S2924	C-121-08773	E609			-----	N/A
R757	C-0S2924	C-121-08773	E609			-----	N/A
R758	C-0S2924	C-121-08773	E609			-----	N/A
R759	C-0S2924	C-121-08773	E609			-----	N/A
R760	C-0S2924	C-121-08773	E609			-----	N/A
R761	C-0S2924	C-121-08773	E609			-----	N/A
R762	C-0S2924	C-121-08773	E609			-----	N/A
R763	C-0S2924	C-121-08773	E609			-----	N/A

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R764	C-0S2924	C-121-08773	E609			-----	N/A
R765	C-0S2924	C-121-08773	E609			-----	N/A
R766	C-0S2924	C-121-08773	E609			-----	N/A
R767	C-0S2924	C-121-08773	E609			-----	N/A
R768	C-0S2924	C-121-08773	E609			-----	N/A
R769	C-0S2924	C-121-08773	E609			-----	N/A
R770	C-0S2924	C-121-08773	E609			-----	N/A
R771	C-0S2924	C-121-08773	E609			-----	N/A
R772	C-0S2924	C-121-08773	E609			-----	N/A
R773	C-0S2924	C-121-08773	E609			-----	N/A
R774	C-0S2924	C-121-08773	E609			-----	N/A
R775	C-0S2924	C-121-08773	E609			-----	N/A
R776	C-0S2924	C-121-08773	E609			-----	N/A
R777	C-0S2924	C-121-08773	E609			-----	N/A
R778	C-0S2924	C-121-08773	E609			-----	N/A
R779	C-0S2924	C-121-08773	E609			-----	N/A
R780	C-0S2924	C-121-08773	E609			21197	R384
R781	C-0S2924	C-121-08773	E609			-----	N/A
R782	C-0S2924	C-121-08773	E609			-----	N/A
R783	C-0S2924	C-121-08773	E609			-----	N/A
R784	C-0S2924	C-121-08773	E609			-----	N/A
R785	C-0S2924	C-121-08773	E609			-----	N/A
R786	C-0S2924	C-121-08773	E609			-----	N/A
R787	C-0S2924	C-121-08773	E609			-----	N/A
R788	C-0S2924	C-121-08773	E609			-----	N/A
R789	C-0S2924	C-121-08773	E609			-----	N/A
R790	C-0S2924	C-121-08773	E609			-----	N/A
R791	C-0S2924	C-121-08773	E609			-----	N/A
R792	C-0S2924	C-121-08773	E609			-----	N/A
R793	C-0S2924	C-121-08773	E609			-----	N/A
R794	C-0S2924	C-121-08773	E609			-----	N/A
R795	C-0S2924	C-121-08773	E609			-----	N/A
R796	C-0S2924	C-121-08773	E609			-----	N/A
R797	C-0S2924	C-121-08773	E609			-----	N/A
R798	C-0S2924	C-121-08773	E609			-----	N/A
R799	C-0S2924	C-121-08773	E609			-----	N/A
R800	C-0S2924	C-121-08773	E609			-----	N/A
R801	C-0S2924	C-121-08773	E609			-----	N/A
R802	C-0S2924	C-121-08773	E609			-----	N/A
R803	C-0S2924	C-121-08773	E609			-----	N/A
R804	C-0S2924	C-121-08773	E609			-----	N/A
R805	C-0S2924	C-121-08773	E609			-----	N/A
R806	C-0S2924	C-121-08773	E609			-----	N/A
R807	C-0S2924	C-121-08773	E609			-----	N/A
R808	C-0S2924	C-121-08773	E609			21197	R385
R809	C-0S2924	C-121-08773	E609			-----	N/A
R810	C-0S2711	C-121-08360	E117			21311	R514
R811	C-0S2711	C-121-08360	E117			21311	R515
R812	C-0S2711	C-121-08360	E117			21311	R516
R813	C-0S2711	C-121-08360	E117			21311	R517
R814	C-0S2711	C-121-08360	E117			21311	R518

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R815	C-0S2711	C-121-08360	E117			21311	R519
R816	C-0S2711	C-121-08360	E117			21311	R520
R817	C-0S2711	C-121-08360	E117			21311	R521
R818	C-0S2711	C-121-08360	E117			21209	R522
R819	C-0S2711	C-121-08360	E117			21311	R523
R820	C-0S2711	C-121-08360	E117			21311	R524
R821	C-0S2711	C-121-08360	E117			21311	R525
R822	C-0S2711	C-121-08360	E117			21311	R526
R823	C-0S2711	C-121-08360	E117			21311	R527
R824	C-0S2711	C-121-08360	E117			21311	R528
R825	C-0S2711	C-121-08360	E117			21311	R529
R826	C-0S2711	C-121-08360	E117			21311	R530
R827	C-0S2711	C-121-08360	E117			21311	R531
R828	C-0S2711	C-121-08361	E121			21310	R532
R829	C-0S2711	C-121-08361	E121			21310	R533
R830	C-0S2711	C-121-08361	E121			21310	R534
R831	C-0S2711	C-121-08361	E121			21310	R535
R832	C-0S2711	C-121-08361	E121			21310	R536
R833	C-0S2711	C-121-08361	E121			21310	R537
R834	C-0S2711	C-121-08361	E121			21310	R538
R835	C-0S2711	C-121-08361	E121			21310	R539
R836	C-0S2711	C-121-08361	E121			21310	R540
R837	C-0S2711	C-121-08361	E121			21310	R541
R838	C-0S2711	C-121-08361	E121			21310	R542
R839	C-0S2711	C-121-08361	E121			21310	R543
R840	C-0S2711	C-121-08361	E121			21310	R544
R841	C-0S2711	C-121-08361	E121			21310	R545
R842	C-0S2711	C-121 08362	E121			21196	R546
R843	C-0S2711	C-121-08362	E123			21196	R547
R844	C-0S2711	C-121-08362	E123			21196	R548
R845	C-0S2711	C-121-08362	E123			21196	R549
R846	C-0S2711	C-121-08362	E123			21176	R550
R847	C-0S2711	C-121-08362	E123			21196	R551
R848	C-0S2711	C-121-08362	E123			21196	R552
R849	C-0S2711	C-121-08362	E123			21196	R553
R850	C-0S2711	C-121-08362	E123			21196	R554
R851	C-0S2711	C-121-08362	E123			21196	R555
R852	C-0S2711	C-121-08362	E123			21176	R556
R853	C-0S2711	C-121-08362	E123			21196	R557
R854	C-0S2711	C-121-08362	E123			21196	R558
R855	C-0S2711	C-121-08362	E123			21196	R559
R856	C-0S2711	C-121-08355	E122			21211	R352/R560
R857	C-0S2711	C-121-08355	E122			21211	R360/R561
R858	C-0S2711	C-121-08355	E122			21211	R361/R562
R859	C-0S2711	C-121-08355	E122			21211	R362/R563
R860	C-0S2711	C-121-08355	E122			21211	R363/R564
R861	C-0S2711	C-121-08355	E122			21211	R364/R565
R862	C-0S2711	C-121-08355	E122			21308	R566
R863	C-0S2711	C-121-08355	E122			21308	R567
R864	C-0S2711	C-121-08355	E122			21308	R568
R865	C-0S2711	C-121-08355	E122			21211	R569

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STRUCTURAL JOINTS TRACKING

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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R866	C-0S2711	C-121-08355	E122			21308	R570
R867	C-0S2711	C-121-08355	E122			21308	R571
R868	C-0S2711	C-121-08355	E122			21308	R572
R869	C-0S2711	C-121-08355	E122			21308	R573
R870	C-0S2312	C-131-05743	E12			-----	N/A
R871	C-0S2312	C-131-05743	E12			21232	R438
R872	C-0S2312	C-131-05743	E12			-----	N/A
R873	C-0S2312	C-131-05743	E12			21232	R437
R874	C-0S2312	C-131-05743	E12			-----	N/A
R875	C-0S2312	C-131-05743	E12			-----	R440
R876	C-0S2312	C-131-05743	E12			21232	R634
R877	C-0S2312	C-131-05743	E12			21232	R442
R878	C-0S2312	C-131-05743	E12			-----	N/A
R879	C-0S2312	C-131-05743	E12			-----	N/A
R880	C-0S2312	C-131-05743	E12			-----	R441
R881	C-0S2312	C-131-05743	E12			-----	N/A
R882	C-0S2312	C-131-05743	E12			-----	N/A
R883	C-0S2312	C-131-05743	E12			-----	N/A
R884	C-0S2312	C-131-05743	E12			-----	N/A
R885	C-0S2312	C-131-05743	E12			-----	N/A
R886	C-0S2312	C-131-05743	E12			21232	R441
R887	C-0S2907	C-131-05666	E1			-----	N/A
R888	C-0S2907	C-131-05666	E1			-----	N/A
R889	C-0S2907	C-131-05666	E1			21375	R648
R890	C-0S2907	C-131-05666	E1			-----	N/A
R891	C-0S2907	C-131-05666	E1			-----	N/A
R892	C-0S2907	C-131-05666	E1			-----	N/A
R893	C-0S2907	C-131-05666	E1			-----	N/A
R894	C-0S2907	C-131-05666	E1			-----	N/A
R895	C-0S2907	C-131-05666	E1			-----	N/A
R896	C-0S2907	C-131-05666	E1			-----	N/A
R897	C-0S2907	C-131-05666	E1			-----	N/A
R898	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R899	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R900	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R901	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R902	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R903	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R904	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R905	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R906	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R907	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R908	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R909	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R910	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R911	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R912	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R913	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R914	C-0S2907	C-131-05666	E1			-----	VOID CONSTRUCTION NOT COMPLETED
R915	C-0S2907	C-131-05666	E1			21375	R647
R916	C-0S2907	C-131-05666	E1			21406	R609/R610

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.
R917	C-0S2907	C-131-05666	E1			-----	N/A
R918	C-0S2907	C-131-05666	E1			-----	N/A
R919	C-0S2907	C-131-05666	E1			-----	N/A
R920	C-0S2907	C-121-05666	E1			-----	N/A
R921	C-0S2907	C-131-05666	E1			-----	N/A
R922	C-0S2907	C-131-05666	E1			-----	N/A
R923	C-0S2907	C-131-05666	E1			-----	N/A
R924	C-0S2907	C-131-05666	E1			-----	N/A
R925	C-1S2312	C-1X-2925				-----	N/A
R926	C-1S2312	C-1X-2925				-----	N/A
R927	C-1S2312	C-1X-2925				-----	N/A
R928	C-1S2313	C-0X-2905				-----	N/A
R929	C-1S2312	C-1X-2925				-----	N/A
R930	C-1S2312	C-1X-2925				-----	N/A
R931	C-1S2312	C-1X-2925				-----	N/A
R932	C-1S2312	C-1X-2925				21406	R669
R933	C-1S2312	C-1X-2925				-----	N/A
R934	C-1S2313	C-0X-2905				-----	N/A
R935	C-1S2313	C-0X-2905				-----	N/A
R936	C-1S2312	C-1X-2925				-----	N/A
R937	C-1S2312	C-1X-2925				-----	N/A
R938	C-1S2312	C-1X-2925				21406	R670
R939	C-1S2312	C-1X-2925				-----	N/A
R940	C-1S2312	C-1X-2925				-----	N/A
R941	C-0S2315	C-0X-2917				-----	N/A
R942	C-0S2315	C-0X-2917				-----	N/A
R943	C-0S2315	C-0X-2917				-----	N/A
R944	C-0S2315	C-0X-2917				-----	N/A
R945	C-0S2511	C-121-08909	E105			21274	R466/R467
R946	C-0S2511	C-121-08909	E105			21274	N/A
R947	C-0S2511	C-121-08909	E105			21274	R458/R459
R948	C-0S2511	C-121-08909	E105			21274	N/A
R949	C-0S2511	C-121-08909	E105			21275	R613
R950	C-0S2511	C-121-08909	E105			21275	R614
R951	C-0S2511	C-121-08909	E105			21275	R615
R952	C-0S2511	C-121-08909	E105			21275	R616
R953	C-0S2511	C-121-08909	E105			21275	R617
R954	C-0S2511	C-121-08909	E105			21275	R618
R955	C-0S2311	C-0X-2902				-----	N/A
R956	C-0S2311	C-0X-2902				-----	N/A
R957	C-0S2311	C-0X-2902				-----	N/A
R958	C-0S2311	C-0X-2902				-----	N/A
R959	C-0S2511	C-121-08577	E106			21303	R468
R960	C-0S2511	C-121-08577	E106			21303	R469
R961	C-0S2511	C-121-08577	E106			21375	R587
R962	C-0S2511	C-121-08577	E106			21303	R470
R963	C-0S2511	C-121-08577	E106			21375	R588
R964	C-0S2311	C-0X-2902				-----	N/A
R965	C-0S2311	C-0X-2902				-----	N/A
R966	C-0S2521	C-121-08912	E107			21375	R627
R967	C-0S2521	C-121-08576	E108			21375	R628

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.	
R968	C-0S2521	C-121-08576	E108			21375	R629	
R969	C-0S2521	C-121-08576	E108			21375	R630	
R970	C-0S2521	C-121-08576	E108			21375	R631	
R971	C-0S2521	C-121-08576	E108			21375	R632	
R972	C-0S2521	C-121-08576	E108			21375	R633	
R973	C-0S2001	C-121-08367	E120			-----	N/A	
R974	C-0S2001	C-121-08367	E120			-----	N/A	
R975	C-0S2521	C-121-08576	E108			21302	R471	
R976	C-0S2521	C-121-08576	E108			21302	R472	
R977	C-0S2611	C-121-13093	E109			21271	R460/R461/R536	
R978	C-0S2611	C-121-08263	E110			21271	R462/R463	
R979	C-0S2611	C-121-08625	E110			21277	R443	
R980	C-0S2611	C-121-08625	E110			21277	R444	
R981	C-0S2611	C-121-08625	E110			21277	R445	
R982	C-0S2611	C-121-08625	E110			-----	N/A	
R983	C-0S2621	C-121-08523	E111			21276	R455	
R984	C-0S2621	C-121-08523	E111			21276	R454	
R985	C-0S2621	C-121-08523	E111			21276	R451	
R986	C-0S2611	C-121-13265	FW13			21276	R452/R453	
R987	C-0S2611	C-121-13265	FW13			-----	N/A	
R988	C-0S2611	C-121-13265	FW13			21275	R447/R448	
R989	C-0S2611	C-121-13265	FW13			21275	R456/R457	
R990	C-0S2001	C-121-08367	E120			-----	N/A	
R991	C-0S2001	C-121-08367	E120			21323	R589	
R992	C-0S2001	C-121-08367	E120			21323	R590	
R993	C-1S2313	C-0X-2905				-----	N/A	
R994	C-1S2313	C-0X-2905				-----	N/A	
R995	C-0S2902	C-0X-2904				21406	R623	FCR 1-0899-C
R996	C-0S2511					-----	N/A	FCR 1-0899-C
R997	C-0S2511					21354		FCR 1-0899-C
R998	C-0S2521					21354		FCR 1-0899-C
R999	C-0S2521					21354		FCR 1-0899-C
RA	C-0S2311	C-121-08549	E601			20567		
RB	C-0S2411	C-121-08506	E102			20567		SAME AS R12
RC	C-0S2521	C-121-08912	E107			20567		
RD	C-0S2521	C-121-13069	E125			-----	N/A	
RE	C-0S2611	C-121-13093	E109			-----	N/A	SAME AS R42
RF	C-0S2904	C-121-08543	E124			20509	R076	
RG01						-----	N/A	CRANE CLIP
RG02						-----	N/A	CRANE CLIP
RG03						-----	N/A	CRANE CLIP
RG04						-----	N/A	CRANE CLIP
RG05						-----	N/A	CRANE CLIP
RG06						-----	N/A	CRANE CLIP
RG07						-----	N/A	CRANE CLIP
RG08						-----	N/A	CRANE CLIP
RG09						-----	N/A	CRANE CLIP
RG10						-----	N/A	CRANE CLIP
RG11						-----	N/A	CRANE CLIP
RG12						-----	N/A	CRANE CLIP
RG13						21221	R401	CRANE CLIP

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 *                                                               E004530
 *                           STRUCTURAL JOINTS TRACKING                          AWS WELDING REPORT, APPENDIX A, PAGE 35
 *        BECHTEL
 *JOINT . DRAWING . ERECTION  .DRAW  .ELEVATON. ---------- LOCATION ----------- .  NCR  .   EVALUATION NO.
 *======.=========.===========.======.========.===============.===============.======.==================================.
  RG14                                                                   -----   N/A                    CRANE CLIP
  RG15                                                                   -----   N/A                    CRANE CLIP
  RG16                                                                   -----   N/A                    CRANE CLIP
  RG17                                                                   -----   N/A                    CRANE CLIP
  RG18                                                                   -----   N/A                    CRANE CLIP
  RG19                                                                   -----   N/A                    CRANE CLIP
  RG20                                                                   -----   N/A                    CRANE CLIP
  RG21                                                                   -----   N/A                    CRANE CLIP
  RG22                                                                   -----   N/A                    CRANE CLIP
  RG23                                                                   -----   N/A                    CRANE CLIP
  RG24                                                                   21211   R402                   CRANE CLIP
  RG25                                                                   -----   N/A                    CRANE CLIP
  RG26                                                                   21221   R403                   CRANE CLIP
  RG27                                                                   21221   R404                   CRANE CLIP
  RG28                                                                   -----   N/A                    CRANE CLIP
  RG29                                                                   21221   R405                   CRANE CLIP
  RG30                                                                   21221   R406                   CRANE CLIP
  RG31                                                                   21221   R407                   CRANE CLIP
  RG32                                                                   -----   N/A                    CRANE CLIP
  RG33                                                                   -----   N/A                    CRANE CLIP
  RG34                                                                   -----   N/A                    CRANE CLIP
  RG35                                                                   -----   N/A                    CRANE CLIP
  RG36                                                                   -----   N/A                    CRANE CLIP
  RG37                                                                   -----   N/A                    CRANE CLIP
  RG38                                                                   -----   N/A                    CRANE CLIP
  RG39                                                                   -----   N/A                    CRANE CLIP
  RG40                                                                   -----   N/A                    CRANE CLIP
  RG41                                                                   -----   N/A                    CRANE CLIP
  RG42                                                                   -----   N/A                    CRANE CLIP
  RG43                                                                   -----   N/A                    CRANE CLIP
  RG44                                                                   -----   N/A                    CRANE CLIP
  RG45                                                                   -----   N/A                    CRANE CLIP
  RG46                                                                   -----   N/A                    CRANE CLIP
  RG47                                                                   -----   N/A                    CRANE CLIP
  RG48                                                                   -----   N/A                    CRANE CLIP
  RG49                                                                   -----   N/A                    CRANE CLIP
  RG50                                                                   -----   N/A                    CRANE CLIP
  RG51                                                                   21221   R408                   CRANE CLIP
  RG52                                                                   21221   R409                   CRANE CLIP
  RG53                                                                   21221   R410                   CRANE CLIP
  RG54                                                                   21221   R411                   CRANE CLIP
  RG55                                                                   21221   R412                   CRANE CLIP
  RG56                                                                   -----   N/A                    CRANE CLIP
  RG57                                                                   -----   N/A                    CRANE CLIP
  RG58                                                                   -----   N/A                    CRANE CLIP
  RG59                                                                   -----   N/A                    CRANE CLIP
  RG60                                                                   -----   N/A                    CRANE CLIP
  RG61                                                                   -----   N/A                    CRANE CLIP
  RG62                                                                   21221   R413                   CRANE CLIP
  RG63                                                                   21221   R414                   CRANE CLIP
  RG64                                                                   -----   N/A                    CRANE CLIP
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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.	
RG65						-----	N/A	CRANE CLIP
RG66						-----	N/A	CRANE CLIP
RG67						-----	N/A	CRANE CLIP
RG68						-----	N/A	CRANE CLIP
RG69						21221	R415	CRANE CLIP
RG70						-----	N/A	CRANE CLIP
RG71						21221	R416	CRANE CLIP
RG72						-----	N/A	CRANE CLIP
RG73						21221	R417	CRANE CLIP
RG74						21211	R418	CRANE CLIP
RG75						-----	N/A	CRANE CLIP
RG76						21211	R419	CRANE CLIP
RG77						-----	N/A	CRANE CLIP
RG78						-----	N/A	CRANE CLIP
RG79						-----	N/A	CRANE CLIP
RG80						-----	N/A	CRANE CLIP
RG81						-----	N/A	CRANE CLIP
RG82						-----	N/A	CRANE CLIP
RG82						-----	N/A	CRANE CLIP
RG83						-----	N/A	CRANE CLIP
RG84						-----	N/A	CRANE CLIP
RG85						-----	N/A	CRANE CLIP
RG86						-----	N/A	CRANE CLIP
RG87						-----	N/A	CRANE CLIP
RG88						-----	N/A	CRANE CLIP
RG89						-----	N/A	CRANE CLIP
RG90						-----	N/A	CRANE CLIP
RG91						-----	N/A	CRANE CLIP
RG92						-----	N/A	CRANE CLIP
RG93						-----	N/A	CRANE CLIP
RG94						21221	R420	CRANE CLIP
RG95						-----	N/A	CRANE CLIP
RG96						-----	N/A	CRANE CLIP
RG97						-----	N/A	CRANE CLIP
RG98						21221	R421	CRANE CLIP
RG99						21221	R422	CRANE CLIP
RH01						-----	N/A	CRANE CLIP
RH02						-----	N/A	CRANE CLIP
RH03						-----	N/A	CRANE CLIP
RH04						-----	N/A	CRANE CLIP
RH05						-----	N/A	CRANE CLIP
RH06						-----	N/A	CRANE CLIP
RH07						-----	N/A	CRANE CLIP
RH08						-----	N/A	CRANE CLIP
RH09						-----	N/A	CRANE CLIP
RH10						-----	N/A	CRANE CLIP
RH11						-----	N/A	CRANE CLIP
RH12						-----	N/A	CRANE CLIP
RH13						-----	N/A	CRANE CLIP
RH14						-----	N/A	CRANE CLIP
RH15						-----	N/A	CRANE CLIP

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*                                                                E004530
*                          STRUCTURAL JOINTS TRACKING                          AWS WELDING REPORT, APPENDIX A, PAGE 37
*         BECHTEL
*JOINT . DRAWING . ERECTION  .DRAW  .ELEVATON. ----------- LOCATION ------------- . NCR  .   EVALUATION NO.
*======.=========.============.======.========.===============.================.======.===================================.
 RH16                                                                              -----   N/A                     CRANE CLIP
 RH17                                                                              -----   N/A                     CRANE CLIP
 RH18                                                                              -----   N/A                     CRANE CLIP
 RH19                                                                              -----   N/A                     CRANE CLIP
 RH20                                                                              -----   N/A                     CRANE CLIP
 RH21                                                                              -----   N/A                     CRANE CLIP
 RH22                                                                              21221   R423                    CRANE CLIP
 RH23                                                                              -----   N/A                     CRANE CLIP
 RH24                                                                              -----   N/A                     CRANE CLIP
 RH25                                                                              -----   N/A                     CRANE CLIP
 RH26                                                                              -----   N/A                     CRANE CLIP
 RH27                                                                              -----   N/A                     CRANE CLIP
 RH28                                                                              -----   N/A                     CRANE CLIP
 RH29                                                                              -----   N/A                     CRANE CLIP
 RH30                                                                              -----   N/A                     CRANE CLIP
 RH31                                                                              -----   N/A                     CRANE CLIP
 RH32                                                                              -----   N/A                     CRANE CLIP
 RH33                                                                              -----   N/A                     CRANE CLIP
 RH34                                                                              -----   N/A                     CRANE CLIP
 RH35                                                                              -----   N/A                     CRANE CLIP
 RH36                                                                              -----   N/A                     CRANE CLIP
 RH37                                                                              -----   N/A                     CRANE CLIP
 RH38                                                                              -----   N/A                     CRANE CLIP
 RH39                                                                              -----   N/A                     CRANE CLIP
 RH40                                                                              -----   N/A                     CRANE CLIP
 RH41                                                                              -----   N/A                     CRANE CLIP
 RH42                                                                              -----   N/A                     CRANE CLIP
 RH43                                                                              -----   N/A                     CRANE CLIP
 RH44                                                                              -----   N/A                     CRANE CLIP
 RH45                                                                              -----   N/A                     CRANE CLIP
 RH46                                                                              -----   N/A                     CRANE CLIP
 RH47                                                                              -----   N/A                     CRANE CLIP
 RH48                                                                              -----   N/A                     CRANE CLIP
 RH49                                                                              -----   N/A                     CRANE CLIP
 RH50                                                                              -----   N/A                     CRANE CLIP
 RH51                                                                              -----   N/A                     CRANE CLIP
 RH52                                                                              -----   N/A                     CRANE CLIP
 RH53                                                                              -----   N/A                     CRANE CLIP
 RH54                                                                              -----   N/A                     CRANE CLIP
 RH55                                                                              -----   N/A                     CRANE CLIP
 RH56                                                                              -----   N/A                     CRANE CLIP
 RH57                                                                              -----   N/A                     CRANE CLIP
 RH58                                                                              -----   N/A                     CRANE CLIP
 RH59                                                                              -----   N/A                     CRANE CLIP
 RH60                                                                              -----   N/A                     CRANE CLIP
 RH61                                                                              -----   N/A                     CRANE CLIP
 RH62                                                                              -----   N/A                     CRANE CLIP
 RH63                                                                              -----   N/A                     CRANE CLIP
 RH64                                                                              -----   N/A                     CRANE CLIP
 RH65                                                                              -----   N/A                     CRANE CLIP
 RH66                                                                              -----   N/A                     CRANE CLIP
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                                                                 E004530
 *                                   STRUCTURAL JOINTS TRACKING                                  AWS WELDING REPORT, APPENDIX A, PAGE 38
 *          BECHTEL
 *JOINT  . DRAWING .  ERECTION   .DRAW  .ELEVATON. ----------- LOCATION ------------ . NCR   .   EVALUATION NO.
 *=======.=========.============.======.========.=================.================.=======.============================================.
  RH67                                                                              -----   N/A                        CRANE CLIP
  RH68                                                                              -----   N/A                        CRANE CLIP
  RH69                                                                              -----   N/A                        CRANE CLIP
  RH70                                                                              -----   N/A                        CRANE CLIP
  RH71                                                                              -----   N/A                        CRANE CLIP
  RH72                                                                              -----   N/A                        CRANE CLIP
  RH73                                                                              -----   N/A                        CRANE CLIP
  RH74                                                                              -----   N/A                        CRANE CLIP
  RH75                                                                              -----   N/A                        CRANE CLIP
  RH76                                                                              -----   N/A                        CRANE CLIP
  RH77                                                                              -----   N/A                        CRANE CLIP
  RH78                                                                              -----   N/A                        CRANE CLIP
  RH79                                                                              -----   N/A                        CRANE CLIP
  RH80                                                                              -----   N/A                        CRANE CLIP
  RH81                                                                              -----   N/A                        CRANE CLIP
  RH82                                                                              -----   N/A                        CRANE CLIP
  RH83                                                                              -----   N/A                        CRANE CLIP
  RH84                                                                              -----   N/A                        CRANE CLIP
  RH85                                                                              -----   N/A                        CRANE CLIP
  RH86                                                                              -----   N/A                        CRANE CLIP
  RH87                                                                              -----   N/A                        CRANE CLIP
  RH88                                                                              -----   N/A                        CRANE CLIP
  RH89                                                                              -----   N/A                        CRANE CLIP
  RH90                                                                              -----   N/A                        CRANE CLIP
  RH91                                                                              -----   N/A                        CRANE CLIP
  RH92                                                                              21221                              CRANE CLIP
  RH93                                                                              -----   N/A                        CRANE CLIP
  RH94                                                                              -----   N/A                        CRANE CLIP
  RH95                                                                              -----   N/A                        CRANE CLIP
  RH96                                                                              -----   N/A                        CRANE CLIP
  RH97                                                                              -----   N/A                        CRANE CLIP
  RH98                                                                              -----   N/A                        CRANE CLIP
  RH99                                                                              -----   N/A                        CRANE CLIP
  RI01                                                                              -----   N/A                        CRANE CLIP
  RI02                                                                              -----   N/A                        CRANE CLIP
  RI03                                                                              -----   N/A                        CRANE CLIP
  RI04                                                                              -----   N/A                        CRANE CLIP
  RI05                                                                              -----   N/A                        CRANE CLIP
  RI06                                                                              21221   R424                       CRANE CLIP
  RI07                                                                              -----   N/A                        CRANE CLIP
  RI08                                                                              -----   N/A                        CRANE CLIP
  RI09                                                                              -----   N/A                        CRANE CLIP
  RI10                                                                              -----   N/A                        CRANE CLIP
  RI11                                                                              21221   R425                       CRANE CLIP
  RI12                                                                              21221   R426                       CRANE CLIP
  RI13                                                                              21221   R427                       CRANE CLIP
  RI14                                                                              21221   R428                       CRANE CLIP
  RI15                                                                              -----   N/A                        CRANE CLIP
  RI16                                                                              -----   N/A                        CRANE CLIP
  RI17                                                                              -----   N/A                        CRANE CLIP
  RI18                                                                              -----   N/A                        CRANE CLIP
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STRUCTURAL JOINTS TRACKING

AWS WELDING REPORT, APPENDIX A. PAGE 39

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.	
RI19						-----	N/A	CRANE CLIP
RI20						-----	N/A	CRANE CLIP
RI21						-----	N/A	CRANE CLIP
RI22						-----	N/A	CRANE CLIP
RI23						-----	N/A	CRANE CLIP
RI24						-----	N/A	CRANE CLIP
RI25						-----	N/A	CRANE CLIP
RI26						-----	N/A	CRANE CLIP
RI27						-----	N/A	CRANE CLIP
RI28						-----	N/A	CRANE CLIP
RI29						-----	N/A	CRANE CLIP
RI30						-----	N/A	CRANE CLIP
RJ01						-----	N/A	NCR 1SN2585C
RJ02						-----	N/A	NCR 1SN2585C
RJ03						-----	N/A	NCR 1SN2658C
RJ04						-----	N/A	NCR 1SN2685C
RJ05	C-0S2621	C-121-08523	E111			-----	N/A	FAB REQ. RB332
RJ06						-----	N/A	NCR 1SN12972C
RJ07						-----	N/A	NCR 1SN12992C
RJ08	C-0S2311	C-121-08787	E605			-----	INACCESSIBLE	NCR 1SN13013C
RJ09						-----	N/A	NCR 1SN13017C
RJ10						-----	N/A	NCR 1SN3147C
RJ11						-----	N/A	NCR 1SN3230CW
RJ12						-----	N/A	NCR 1SN3255C
RJ13						-----	N/A	NCR 1SN3261C
RJ14						-----	N/A	NCR 1SN3385C
RJ15						-----	R636	NCR 1SN3355C
RJ16						-----	N/A	NCR 1SN3386C
RJ17						-----	N/A	NCR 1SN3482C
RJ18	C-0S2919					-----	INACCESSIBLE	NCR 1SN4536C
RJ19	C-0S2511	C-121-08909	E105			-----	N/A	NCR 1SN3589C
RJ20						21406		NCR 1SN3774C
RJ21						-----	N/A	NCR 1SN3795C
RJ22	C-0S2312	C-121-08982	E610			-----	N/A	NCR 1SN4339C
RJ23	C-0S2621	C-121-08523	E111			-----	N/A	NCR 1SN4276C
RJ24						-----	N/A	NCR 1SN8612C
RJ25	C-0S2621	C-121-08523	E111			-----	VOID, SAME AS RJ04	NCR 1SN12190C
RJ26	C-0S2919					-----	INACCESSIBLE	NCR 1SN4536C
RJ27	C-0S2711	C-121-08362	E123			-----	N/A	NCR 1SN19864C
RJ28	C-0S2711	C-121-08355	E122			-----	N/A	NCR 1SN19864C
RJ29	C-0S2711	C-121-08360	E117			-----	N/A	NCR 1SN19864C
RJ30	C-0S2711	C-121-08360	E117			-----	N/A	NCR 1SN19864C
RJ31	C-0S2711	C-121-08361	E121			-----	N/A	NCR 1SN19864C
RJ32						-----	N/A	NCR 1SN2693C
RJ33	C-0S2411	C-121-08506	E102			-----	N/A	NCR 1SN1649C
RJ34	C-0S2511	C-121-08909	E105			-----	N/A	NCR 1SN2138C
RJ35	C-0S2411	C-121-08506	E102			-----	N/A	NCR 1SN1568C
RJ36	C-0S2312	C-121-08982	E610			-----	N/A	NCR 1SN4389C
RJ37						-----	N/A	NCR 1SN3796C
RJ38	C-0S2919	C-121-08752	E602			-----	INACCESSIBLE	FAB REQ. RB341
RJ39	C-0S2919	C-121-08752	E602			-----	INACCESSIBLE	FAB REQ. RB341

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION	NCR	EVALUATION NO.	
RJ40	C-0S2521	C-121-08576	E108			-----	N/A	FAB REQ. RB308
RJ41	C-0S2511	C-121-08577	E106			-----	N/A	FAB REQ. RB265
RJ42	C-0S2621	C-121-08523	E111			-----	INACCESSIBLE	FAB REQ. RB436
RJ43	C-0S2621	C-121-08523	E111			21406	R659	FAB REQ. RB436
RJ44	C-0S2611					-----	N/A	NCR 1SN11282C
RJ45	C-0S2611					-----	N/A	NCR 1SN11282C
RJ46	C-0S2611					-----	N/A	NCR 1SN11282C
RJ47	C-0S2611					-----	N/A	NCR 1SN11282C
RJ48	C-0S2611					-----	N/A	NCR 1SN11282C
RJ49	C-0S2611					-----	N/A	NCR 1SN11282C
RJ50	C-0S2611					-----	N/A	NCR 1SN11282C
RJ51	C-0S2611					-----	N/A	NCR 1SN11282C
RJ52	C-0S2521					21406	R640	NCR 1SN3115C
RJ53	C-0S2521					-----	N/A	NCR 1SN3115C
RJ54	C-0S2521					21406	R641	NCR 1SN3115C
RJ55	C-0S2521					21406	R642	NCR 1SN3115C
RJ56	C-0S2521					-----	N/A	NCR 1SN3115C
RJ57	C-0S2521					21406	R643	NCR 1SN3115C
RJ58	C-1S2313	C-0X-2905				21406	R660	
RJ59	C-1S2313	C-0X-2905				21406		
RJ60						-----	VOID	NO. NOT USED
RJ61	C-0S2919					-----	INACCESSIBLE	NCR 1SN4536C
RJ62	C-0S2919					-----	INACCESSIBLE	NCR 1SN4536C
RJ63		C-121-13266				-----	N/A	FAB REQ. RB555
RJ64		C-121-13266				21406	R652	FAB REQ. RB555
RJ65		C-121-13266				-----	N/A	FAB REQ. RB555
RJ66		C-121-13266				-----	N/A	FAB REQ. RB555
RJ67		C-121-13266				-----	N/A	FAB REQ. RB555
RJ68		C-121-13266				-----	N/A	FAB REQ. RB555
RJ69		C-121-13266				-----	N/A	FAB REQ. RB555
RJ70		C-121-13266				-----	N/A	FAB REQ. RB555
RJ71		C-121-08759				-----	INACCESSIBLE	FAB REQ. RB411
RJ72		C-121-08759				-----	INACCESSIBLE	FAB REQ. RB411
RJ73		C-121-08133				-----	N/A	FAB REQ. RB503
RJ74		C-121-08133				-----	N/A	FAB REQ. RB503
RJ75		C-121-08987				-----	N/A	FAB REQ. RB381
RJ76		C-121-08987				-----	N/A	FAB REQ. RB381
RJ77		C-121-08987				-----	N/A	FAB REQ. RB381
RJ78		C-121-08987				21406		FAB REQ. RB381
RJ79		C-121-08039				-----	N/A	NCR 1SN2728C
RJ80		C-121-08039				-----	N/A	NCR 1SN2728C
RJ81		C-121-08039				-----	N/A	NCR 1SN2728C
RJ82		C-121-08039				-----	N/A	NCR 1SN2728C
RJ83	C-0S2611	C-121-08625	E110			20494	R676	
RJ84	C-0S2611	C-121-08625	E110			20494	R677	
RJ85	C-0S2621	C-121-08523	E111			20494	R678	
RJ86	C-0S2621	C-121-08523	E111			20494	R679	
RJ87	C-0S2924	C-121-08773	E609			20494	R680	
RJ88	C-0S2924	C-121-08773	E609			20494	R681	
RJ89	C-0S2924	C-121-08773	E609			20494	R682	
RJ90	C-0S2924	C-121-08773	E609			20494	R683	

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                                                              E004530
*                       STRUCTURAL JOINTS TRACKING                                AWS WELDING REPORT, APPENDIX A, PAGE 41
*        BECHTEL
*JOINT . DRAWING .  ERECTION  .DRAW  .ELEVATON. ---------- LOCATION ----------- .  NCR  .   EVALUATION NO.
*======.=========.============.======.========.==================================.=======.==============================================.
 RJ91   C-0S2935  C-121-05671  35-E2                                              20509   R604
 RJ92   C-0S2935  C-121-05671  35-E2                                              20509   R605
 RJ93   C-0S2311  C-121-08786  E604                                               20494   R058/R062
 RJ94   C-0S2311  C-121-08786  E604                                               20494   R063/R064
                     ..... END REPORT .....
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.DATE 27 DEC 84 17:31:23 RID 1 01 DEC 84 BECHTEL

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STRUCTURAL JOINTS TRACKING

AWS WELDING REPORT, APPENDIX A, PAGE 42

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
C001	C-0S3211	C-121-01426	E001	1984-00	2-0 N OF C8	5-8 W OF CB	-----	C352
C002	C-0S3311	C-121-01408	E002	2000-00	2-0 N OF C8	15-0 W OF CC	20947	C007/C008/C009
C003	C-0S3311	C-121-01408	E002	2000-00	2-0 N OF C8	14-6 W OF CA	20947	C010/C011/C012
C004	C-0S3311	C-121-01408	E002	2000-00	18-0 S OF C5	2-0 W OF CA	20947	C013/C014/C015
C005	C-0S3311	C-121-01408	E002	2000-00	13-0 S OF C5	2-0 W OF CA	20947	C016/C017/C018
C006	C-0S3311	C-121-01408	E002	2000-00	7-10 S OF C5	2-0 W OF CA	20947	C019/C020/C021
C007	C-0S3311	C-121-01408	E002	2000-00	8-0 N OF C5	2-0 W OF CA	20948	C022/C023
C008	C-0S3311	C-121-01408	E002	2000-00	5-0 S OF C3	2-0 W OF CA	20947	C024/C025/C026/C027
C009	C-0S3311	C-121-01408	E002	2000-00	6-0 S OF C1	1-6 E OF CF	20947	C028/C029/C030/C031
C010	C-0S3411	C-121-01411	E003	2016-00	1-0 N OF C8	14-6 W OF CA	21348	C358
C011	C-0S3411	C-121-01411	E003	2016-00	11-6 N OF C3	2-0 W OF CA	20985	C101/C102/C103
C012	C-0S3411	C-121-01411	E003	2016-00	1-0 S OF C1	CC	20985	C104
C013	C-0S3411	C-121-01411	E003	2016-00	9-0 S OF C1	0-6 E OF CF	20985	C105/C106/C107
C014	C-0S3411	C-121-01411	E003	2016-00	8-0 N OF C3	0-6 E OF CF	20985	C108/C109
C015	C-0S3511	C-121-01414	E004	2032-00	1-0 N OF C8	8-0 W OF CC	21015	C110/C111
C016	C-0S3511	C-121-01414	E004	2032-00	11-6 N OF C3	2-0 W OF CA	21015	C112/C113
C017	C-0S3511	C-121-01414	E004	2032-00	4-3 S OF C1	2-0 W OF CA	21015	C114
C018	C-0S3511	C-121-01414	E004	2032-00	1-0 S OF C1	14-6 W OF CA	21349	C360
C019	C-0S3511	C-121-01414	E004	2032-00	1-0 S OF C1	CC	21014	C246
C020	C-0S3511	C-121-01414	E004	2032-00	1-0 S OF C1	14-6 E OF CF	21014	C343
C021	C-0S3511	C-121-01414	E004	2032-00	16-0 N OF C5	0-6 E OF CF	21015	C115
C022	C-0S3611	C-121-01417	E005	2047-06	1-0 N OF C3	3-0 W OF CC	21048	C032/C033/C034
C023	C-0S3611	C-121-01417	E005	2047-06	1-0 N OF C8	CC	21048	C035/C036/C037/C038
C024	C-0S3611	C-121-01417	E005	2047-06	1-0 N OF C8	7-10 E OF CC	21048	C396/C397/C398
C025	C-0S3611	C-121-01417	E005	2047-06	1-0 N OF C8	19-3 W OF CA	21048	C158/C159/C160/C161
C026	C-0S3611	C-121-01417	E005	2047-06	1-0 N OF C8	14-6 W OF CA	21349	C354
C027	C-0S3611	C-121-01417	E005	2047-06	13-6 N OF C7	2-0 W OF CA	21048	C162/C163/C164
C028	C-0S3611	C-121-01417	E005	2047-06	13-0 S OF C5	2-0 W OF CA	21048	C373/C374/C375
C029	C-0S3611	C-121-01417	E005	2047-06	7-10 S OF C5	2-0 W OF CA	21048	C376/C377
C030	C-0S3611	C-121-01417	E005	2047-06	8-0 N OF C5	2-0 W OF CA	21048	C039/C040/C041/C395
C031	C-0S3611	C-121-01417	E005	2047-06	5-0 S OF C3	2-0 W OF CA	21046	C362/C363/C364
C032	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	14-6 W OF CA	21349	C383
C033	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	15-10 W OF CC	21047	C042
C034	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	2-0 E OF CF	21046	C043
C035	C-0S3612	C-121-01484	E012	2059-03	1-0 N OF C8	10-9 E OF CC	21031	C044/C045/C046/C047
C036	C-0S3612	C-121-01484	E012	2059-03	C7	15-0 W OF CA	21032	C048/C049/C050
C037	C-0S3612	C-121-01484	E012	2059-03	0-6 N OF C7	13-8 W OF CA	21032	C051/C052/C053
C038	C-0S3612	C-121-01484	E012	2059-03	11-4 N OF C7	2-0 W OF CA	21031	C054/C055/C056/C057
C039	C-0S3612	C-121-01484	E012	2059-03	9-5 S OF C5	2-0 W OF CA	21031	C058/C059/C060/C061
C040	C-0S3612	C-121-01484	E012	2059-03	5-4 S OF C5	7-0 W OF CA	21032	C062/C063/C064
C041	C-0S3612	C-121-01484	E012	2059-03	C5	7-0 W OF CA	21031	C165/C166/C385
C042	C-0S3612	C-121-01484	E012	2059-03	7-7 N OF C5	7-0 W OF CA	21032	C065/C066/C067
C043	C-0S3612	C-121-01484	E012	2059-03	13-4 S OF C3	2-0 W OF CA	21031	C068/C069/C070
C044	C-0S3612	C-121-01484	E012	2059-03	C3	13-10 W OF CA	------	N/A
C045	C-0S3612	C-121-01484	E012	2059-03	1-0 S OF C1	9-0 W OF CC	21031	C071
C046	C-0S3612	C-121-01484	E012	2059-03	C3	0-6 E OF CF	21031	C072/C073/C074/C075
C047	C-0S3612	C-121-01484	E012	2059-03	C5	0-6 E OF CF	21031	C167/C168/C169/C387/C388
C048	C-0S3612	C-121-01484	E012	2059-03	6-5 S OF C5	0-6 E OF CF	21031	C076/C077/C078/C079
C049	C-0S3612	C-121-01484	E012	2059-03	9-5 S OF C5	0-6 E OF CF	21031	C080/C081/C082

STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATION	LOCATION		NCR	EVALUATION NO.
C050	C-0S3612	C-121-01484	E012	2059-03	11-4 N OF C7	0-6 E OF CF	21031	C083/C084/C085/C086
C051	C-0S3612	C-121-01484	E012	2059-03	8-4 N OF C7	0-6 E OF CF	21031	C087/C088
C052	C-0S3612	C-121-01484	E012	2059-03	0-6 N OF C7	3-0 E OF CF	21032	C089/C090/C091
C053	C-0S3612	C-121-01484	E012	2059-03	0-6 N OF C7	9-6 E OF CF	21032	C092/C093/C094/C387
C054	C-0S3612	C-121-01484	E012	2059-03	0-6 N OF C7	15-10 W OF CC	21032	C095/C096/C097
C055	C-0S3612	C-121-01484	E012	2059-03	0-6 N OF C7	9-5 W OF CC	21031	C098/C099/C100/C351
C056	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	2-0 E OF CF	21002	C116
C057	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	7-0 E OF CF	21001	C117
C058	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	10-11 W OF CC	21001	C118/C119
C059	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	8-0 W OF CC	21001	C120/C121
C060	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	CC	21001	C122/C123
C061	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	7-10 E OF CC	21001	C124/C125
C062	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	15-9 E OF CC	21001	C126
C063	C-0S3711	C-121-01420	E006	2073-06	1-0 N OF C8	14-6 W OF CA	21349	C355
C064	C-0S3711	C-121-01420	E006	2073-06	5-3 N OF C8	2-0 W OF CA	21002	C127
C065	C-0S3711	C-121-01420	E006	2073-06	4-3 S OF C7	2-0 W OF CA	21002	C128
C066	C-0S3711	C-121-01420	E006	2073-06	C7	2-0 W OF CA	21002	C129
C067	C-0S3711	C-121-01420	E006	2073-06	13-6 N OF C7	2-0 W OF CA	21002	C130
C068	C-0S3711	C-121-01420	E006	2073-06	13-0 S OF C5	2-0 W OF CA	21001	C131/C132/C133
C069	C-0S3711	C-121-01420	E006	2073-06	7-10 S OF C5	2-0 W OF CA	21002	C134/C135/C369/C370
C070	C-0S3711	C-121-01420	E006	2073-06	C5	2-0 W OF CA	-----	INACCESSIBLE
C071	C-0S3711	C-121-01420	E006	2073-06	8-0 N OF C5	2-0 W OF CA	21002	C170/C171/C367/C368
C072	C-0S3711	C-121-01420	E006	2073-06	5-0 S OF C3	2-0 W OF CA	21001	C136/C137/C138/C139
C073	C-0S3711	C-121-01420	E006	2073-06	C3	2-0 W OF CA	21002	C140
C074	C-0S3711	C-121-01420	E006	2073-06	11-6 N OF C3	2-0 W OF CA	-----	C356
C075	C-0S3711	C-121-01420	E006	2073-06	9-3 S OF C1	2-0 W OF CA	21001	C141
C076	C-0S3711	C-121-01420	E006	2073-06	5-3 S OF C1	2-0 W OF CA	21002	C142
C077	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	14-6 W OF CA	21349	C357
C078	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	15-9 E OF CC	21001	C143/C144
C079	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	7-10 E OF CC	21002	C145
C080	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	CC	21001	C146
C081	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	8-0 W OF CC	21002	C147
C082	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	13-6 W OF CC	21002	C148
C083	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	17-0 W OF CC	21001	C149
C084	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	8-3 E OF CF	21001	C150
C085	C-0S3711	C-121-01420	E006	2073-06	1-0 S OF C1	2-0 E OF CF	21032	C151/C152
C086	C-0S3711	C-121-01420	E006	2073-06	C3	0-6 E OF CF	21001	C153/C154
C087	C-0S3711	C-121-01420	E006	2073-06	C5	0-6 E OF CF	21001	C155/C156
C088	C-0S3711	C-121-01420	E006	2073-06	C7	0-6 E OF CF	21001	C157
C089	C-0S3211	C-121-01426	E001	1984-00	2-0 N OF C8	CD	20899	C172/C173/C174
C090	C-0S3211	C-121-01426	E001	1984-00	2-0 N OF C8	CC	20899	C312/C313/C314/C315
C091	C-0S3211	C-121-01426	E001	1984-00	2-0 N OF C8	1-9 W OF CB	21133	C353
C092	C-0S3211	C-121-01426	E001	1984-00	7-6 N OF C8	2-0 W OF CA	-----	N/A
C093	C-0S3211	C-121-01426	E001	1984-00	C7	2-0 W OF CA	20899	C175/C176
C094	C-0S3211	C-121-01426	E001	1984-00	8-0 S OF C5	2-0 W OF CA	20899	C316
C095	C-0S3211	C-121-01426	E001	1984-00	6-0 S OF C5	2-0 W OF CA	20700	C177
C096	C-0S3211	C-121-01426	E001	1984-00	C5	2-0 W OF CA	20900	C178
C097	C-0S3211	C-121-01426	E001	1984-00	C4	2-0 W OF CA	20900	C317
C098	C-0S3211	C-121-01426	E001	1984-00	8-0 N OF C4	2-0 W OF CA	20899	C179/C180/C181
C099	C-0S3211	C-121-01426	E001	1984-00	C3	2-0 W OF CA	20899	C182/C183/C184/C185
C100	C-0S3211	C-121-01426	E001	1984-00	5-9 N OF C3	2-0 W OF CA	20900	C186

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
C101	C-0S3211	C-121-01426	E001	1984-00	C2	2-0 W OF CA	20899	C318
C102	C-0S3211	C-121-01426	E001	1984-00	6-10 N OF C2	2-0 W OF CA	20899	C319
C103	C-0S3211	C-121-01426	E001	1984-00	2-0 S OF C1	6-6 W OF CA	20900	C320
C104	C-0S3211	C-121-01426	E001	1984-00	2-0 S OF C1	CD	20899	C321/C322/C323/C324
C105	C-0S3211	C-121-01426	E001	1984-00	2-0 S OF C1	CC	20899	C187/C188/C189/C190
C106	C-0S3211	C-121-01426	E001	1984-00	2-0 S OF C1	CD	20899	C191/C192/C193/C194
C107	C-0S3211	C-121-01426	E001	1984-00	2-0 S OF C1	2-6 W OF CD	20900	C195
C108	C-0S3211	C-121-01426	E001	1984-00	5-9 N OF C2	1-6 E OF CF	20900	C196
C109	C-0S3211	C-121-01426	E001	1984-00	C2	1-6 E OF CF	-----	N/A
C110	C-0S3211	C-121-01426	E001	1984-00	5-9 N OF C3	1-6 E OF CF	20900	C197
C111	C-0S3211	C-121-01426	E001	1984-00	C3	1-6 E OF CF	20899	C198/C199
C112	C-0S3211	C-121-01426	E001	1984-00	8-0 N OF C4	1-6 E OF CF	20900	C200
C113	C-0S3211	C-121-01426	E001	1984-00	C4	1-6 E OF CF	20899	C201/C202/C203/C204
C114	C-0S3211	C-121-01426	E001	1984-00	C5	1-6 E OF CF	20899	C205/C206/C207/C208
C115	C-0S3211	C-121-01426	E001	1984-00	8-0 N OF C6	1-6 E OF CF	20900	C209
C116	C-0S3211	C-121-01426	E001	1984-00	C7	1-6 E OF CF	20899	C210/C211
C117	C-0S3211	C-121-01426	E001	1984-00	7-6 N OF C8	1-6 E OF CF	20899	C212/C213
C118	C-0S3311	C-121-01408	E002	2000-00	2-0 N OF C8	3-0 E OF CF	20948	C214
C119	C-0S3311	C-121-01408	E002	2000-00	2-0 N OF C8	8-0 W OF CC	20947	C215/C216
C120	C-0S3311	C-121-01408	E002	2000-00	2-0 N OF C8	CC	20848	C217
C121	C-0S3311	C-121-01408	E002	2000-00	2-0 N OF C8	7-10 E OF CC	20947	C218/C219
C122	C-0S3311	C-121-01408	E002	2000-00	2-0 N OF C8	15-9 E OF CC	20947	C220/C221
C123	C-0S3311	C-121-01408	E002	2000-00	5-3 N OF C8	2-0 W OF CA	20948	C222
C124	C-0S3311	C-121-01408	E002	2000-00	9-3 N OF C8	2-0 W OF CA	20947	C223/C224
C125	C-0S3311	C-121-01408	E002	2000-00	13-6 N OF C8	2-0 W OF CA	20948	C225/C386
C126	C-0S3311	C-121-01408	E002	2000-00	C5	2-0 W OF CA	-----	INACCESSIBLE
C127	C-0S3311	C-121-01408	E002	2000-00	C3	2-0 W OF CA	20947	C226
C128	C-0S3311	C-121-01408	E002	2000-00	13-6 S OF C1	2-0 W OF CA	20712	C227/C228
C129	C-0S3311	C-121-01408	E002	2000-00	9-3 S OF C1	2-0 W OF CA	20947	C229/C230
C130	C-0S3311	C-121-01408	E002	2000-00	5-3 S OF C1	2-0 W OF CA	20948	C231
C131	C-0S3311	C-121-01408	E002	2000-00	2-0 S OF C1	20-6 E OF CC	20947	C232/C233/C234
C132	C-0S3311	C-121-01408	E002	2000-00	2-0 S OF C1	15-9 E OF CC	20947	C235/C236
C133	C-0S3311	C-121-01408	E002	2000-00	2-0 S OF C1	7-10 E OF CC	20947	C237/C238
C134	C-0S3311	C-121-01408	E002	2000-00	2-0 S OF C1	CC	20948	C239
C135	C-0S3311	C-121-01408	E002	2000-00	2-0 S OF C1	6-4 W OF CC	20948	C240
C136	C-0S3311	C-121-01408	E002	2000-00	2-0 S OF C1	12-8 W OF CC	20947	C241
C137	C-0S3311	C-121-01408	E002	2000-00	2-0 S OF C1	14-6 E OF CF	20947	C242/C243
C138	C-0S3311	C-121-01408	E002	2000-00	C3	1-6 E OF CF	20948	C244
C139	C-0S3311	C-121-01408	E002	2000-00	C7	1-6 E OF CF	20948	C245
C140	C-0S3411	C-121-01411	E003	2016-00	1-0 N OF C8	2-0 E OF CF	20916	C267
C141	C-0S3411	C-121-01411	E003	2016-00	1-0 N OF C8	8-0 W OF CC	20915	INACCESSIBLE
C142	C-0S3411	C-121-01411	E003	2016-00	1-0 N OF C8	CC	20915	C271/C272
C143	C-0S3411	C-121-01411	E003	2016-00	5-3 N OF C8	2-0 W OF CA	20916	C273
C144	C-0S3411	C-121-01411	E003	2016-00	9-3 N OF C8	2-0 W OF CA	20916	C274
C145	C-0S3411	C-121-01411	E003	2016-00	C7	2-0 W OF CA	20916	C275/C276
C146	C-0S3411	C-121-01411	E003	2016-00	7-10 N OF C7	2-0 W OF CA	20915	C277/C278
C147	C-0S3411	C-121-01411	E003	2016-00	18-0 S OF C5	2-0 W OF CA	20916	C279
C148	C-0S3411	C-121-01411	E003	2016-00	13-0 S OF C5	2-0 W OF CA	20916	C280
C149	C-0S3411	C-121-01411	E003	2016-00	7-10 S OF C5	2-0 W OF CA	20915	C281/C282
C150	C-0S3411	C-121-01411	E003	2016-00	C5	2-0 W OF CA	20916	C283
C151	C-0S3411	C-121-01411	E003	2016-00	8-0 N OF C5	2-0 W OF CA	20916	C284/C394

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STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
C152	C-0S3411	C-121-01411	E003	2016-00	16-0 N OF C5	2-0 W OF CA	20916	C285
C153	C-0S3411	C-121-01411	E003	2016-00	8-0 S OF C3	2-0 W OF CA	20715	C286
C154	C-0S3411	C-121-01411	E003	2016-00	5-0 S OF C3	2-0 W OF CA	20916	C287
C155	C-0S3411	C-121-01411	E003	2016-00	C3	2-0 W OF CA	20714	C288
C156	C-0S3411	C-121-01411	E003	2016-00	8-0 N OF C3	2-0 W OF CA	20916	C289
C157	C-0S3411	C-121-01411	E003	2016-00	9-0 S OF C1	2-0 W OF CA	20715	C290
C158	C-0S3411	C-121-01411	E003	2016-00	5-3 S OF C1	2-0 W OF CA	20915	C291
C159	C-0S3411	C-121-01411	E003	2016-00	1-0 S OF C1	14-6 W OF CA	21349	C359
C160	C-0S3411	C-121-01411	E003	2016-00	1-0 S OF C1	14-6 E OF CF	20915	C292
C161	C-0S3411	C-121-01411	E003	2016-00	C3	0-6 E OF CF	20716	C293
C162	C-0S3411	C-121-01411	E003	2016-00	8-0 S OF C3	0-6 E OF CF	20915	C294
C163	C-0S3411	C-121-01411	E003	2016-00	16-0 N OF C5	0-6 E OF CF	20916	C295
C164	C-0S3411	C-121-01411	E003	2016-00	8-0 N OF C5	0-6 E OF CF	20915	C296
C165	C-0S3411	C-121-01411	E003	2016-00	C5	0-6 E OF CF	20715	C297
C166	C-0S3411	C-121-01411	E003	2016-00	7-10 S OF C5	0-6 E OF CF	20916	C298
C167	C-0S3411	C-121-01411	E003	2016-00	15-9 N OF C7	0-6 E OF CF	20716	C299
C168	C-0S3411	C-121-01411	E003	2016-00	7-10 N OF C7	0-6 E OF CF	20916	C300
C169	C-0S3411	C-121-01411	E003	2016-00	C7	0-6 E OF CF	20716	C301
C170	C-0S3511	C-121-01414	E004	2032-00	1-0 N OF C8	2-0 E OF CF	21015	C247
C171	C-0S3511	C-121-01414	E004	2032-00	1-0 N OF C8	16-5 E OF CF	-----	N/A
C172	C-0S3511	C-121-01414	E004	2032-00	1-0 N OF C8	CC	21015	C248
C173	C-0S3511	C-121-01414	E004	2032-00	1-0 N OF C3	14-6 W OF CA	21349	C361/C382
C174	C-0S3511	C-121-01414	E004	2032-00	5-3 N OF C8	2-0 W OF CA	21015	C305
C175	C-0S3511	C-121-01414	E004	2032-00	4-3 S OF C7	2-0 W OF CA	21015	C306
C176	C-0S3511	C-121-01414	E004	2032-00	C7	2-0 W OF CA	21015	C249
C177	C-0S3511	C-121-01414	E004	2032-00	7-10 N OF C7	2-0 W OF CA	21015	C250
C178	C-0S3511	C-121-01414	E004	2032-00	13-6 N OF C7	2-0 W OF CA	21014	C251
C179	C-0S3511	C-121-01414	E004	2032-00	13-0 S OF C5	2-0 W OF CA	21014	C252
C180	C-0S3511	C-121-01414	E004	2032-00	7-10 S OF C5	2-0 W OF CA	21015	C253/C366
C181	C-0S3511	C-121-01414	E004	2032-00	C5	2-0 W OF CA	21015	C254
C182	C-0S3511	C-121-01414	E004	2032-00	8-0 N OF C5	2-0 W OF CA	21015	C255/C365
C183	C-0S3511	C-121-01414	E004	2032-00	16-0 N OF C5	2-0 W OF CA	21014	C256/C257
C184	C-0S3511	C-121-01414	E004	2032-00	8-0 S OF C3	2-0 W OF CA	21015	C258
C185	C-0S3511	C-121-01414	E004	2032-00	5-0 S OF C3	2-0 W OF CA	21015	C259
C186	C-0S3511	C-121-01414	E004	2032-00	C3	2-0 W OF CA	21014	C260/C261
C187	C-0S3511	C-121-01414	E004	2032-00	8-0 N OF C3	2-0 W OF CA	21015	C307
C188	C-0S3511	C-121-01414	E004	2032-00	8-0 S OF C1	2-0 W OF CA	21015	C262
C189	C-0S3511	C-121-01414	E004	2032-00	C3	0-6 E OF CF	-----	N/A
C190	C-0S3511	C-121-01414	E004	2032-00	8-0 S OF C3	0-6 E OF CF	21015	C344
C191	C-0S3511	C-121-01414	E004	2032-00	8-0 N OF C5	0-6 E OF CF	21015	C263
C192	C-0S3511	C-121-01414	E004	2032-00	C5	0-6 E OF CF	21015	C264
C193	C-0S3511	C-121-01414	E004	2032-00	7-10 S OF C5	0-6 E OF CF	21015	C265
C194	C-0S3511	C-121-01414	E004	2032-00	15-9 S OF C5	0-6 E OF CF	21015	C266
C195	C-0S3511	C-121-01414	E004	2032-00	7-10 N OF C7	0-6 E OF CF	21015	C267
C196	C-0S3511	C-121-01414	E004	2032-00	C7	0-6 E OF CF	21014	C268
C197	C-0S3611	C-121-01417	E005	2047-06	1-0 N OF C8	2-0 E OF CF	21047	C325
C198	C-0S3611	C-121-01417	E005	2047-06	1-0 N OF C8	15-0 W OF CC	21047	C345
C199	C-0S3611	C-121-01417	E005	2047-06	5-3 N OF C8	2-0 W OF CA	21047	C346
C200	C-0S3611	C-121-01417	E005	2047-06	4-3 S OF C7	2-0 W OF CA	21047	C347
C201	C-0S3611	C-121-01417	E005	2047-06	C5	2-0 W OF CA	21349	INACCESSIBLE
C202	C-0S3611	C-121-01417	E005	2047-06	C3	2-0 W OF CA	21046	C326/C327

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
C203	C-0S3611	C-121-01417	E005	2047-06	11-6 N OF C3	2-0 W OF CA	21046	C348
C204	C-0S3611	C-121-01417	E005	2047-06	9-3 S OF C1	2-0 W OF CA	21047	C349
C205	C-0S3611	C-121-01417	E005	2047-06	5-3 S OF C1	2-0 W OF CA	21047	C350
C206	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	15-9 E OF CC	21047	C328
C207	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	7-10 E OF CC	21046	C329/C330
C208	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	CC	21046	C331/C332
C209	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	8-0 W OF CC	21046	C333/C334
C210	C-0S3611	C-121-01417	E005	2047-06	1-0 S OF C1	9-10 E OF CF	21046	C335/C336
C211	C-0S3611	C-121-01417	E005	2047-06	C3	0-6 E OF CF	21046	C337
C212	C-0S3612	C-121-01484	E012	2059-03	1-0 S OF C1	12-3 E OF CF	20904	C338/C339/C340
C213	C-0S3612	C-121-01484	E012	2059-03	14-3 N OF C3	0-6 E OF CF	20904	C341/C342
C214	C-0S3612	C-121-01484	E012	2059-03	10-4 S OF C3	0-6 E OF CF	21349	C370
C215	C-0S3612	C-121-01484	E012	2059-03	10-9 N OF C5	0-6 E OF CF	21349	C391
C216	C-0S3811	C-121-09015	E007	2087-02	C7	2-3 E OF CF	-----	INACCESSIBLE
C217	C-0S3811	C-121-09015	E007	2087-02	C7	9-1 E OF CF	-----	INACCESSIBLE
C218	C-0S3811	C-121-09015	E007	2087-02	C7	15-11E OF CF	21349	INACCESSIBLE
C219	C-0S3811	C-121-09015	E007	2087-02	C7	10-9 W OF CC	21349	INACCESSIBLE
C220	C-0S3612	C-121-01485	E013	2059-03	C3	CC	21019	C308
C221	C-0S3612	C-121-01485	E013	2059-03	C5	CC	21019	C309
C222	C-0S3612	C-121-01485	E013	2059-03	C5	CC	21017	C310
C223	C-0S3612	C-121-01485	E013	2059-03	C7	CC	21019	C311
C224	C-0S3411	C-121-01411	E003	2016-00	1-0 N OF C3	15-0 W OF CC	20916	C302
C225	C-0S3411	C-121-01411	E003	2016-00	5-0 S OF C1	0-6 E OF CF	20915	C303/C304
C226	C-0S3711	C-121-01420	E006	2073-06	C7	9-10 E OF CF	-----	N/A
C227	C-0S3711	C-121-01420	E006	2073-06	C7	15-10 W OF CC	21301	C371
C228	C-0S3612	C-121-01484	E012	2059-03	11-9 N OF C3	CC	21300	C372
C229	C-0S3612	C-121-01484	E012	2059-03	11-9 N OF C3	3-3 E OF CC	-----	N/A
C230	C-0C3902	C-131-05505	4B-E7	2071-00	5-10 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C231	C-0C3902	C-131-05505	4B-E7	2060-02	5-10 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C232	C-0C3902	C-131-05505	4B-E7	2060-02	5-10 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C233	C-0C3902	C-131-05505	4B-E7	2049-04	5-10 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C234	C-0C3902	C-131-05505	4B-E7	2071-00	7-9 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C235	C-0C3902	C-131-05505	4B-E7	2060-02	7-9 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C236	C-0C3902	C-131-05505	4B-E7	2060-02	7-9 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C237	C-0C3902	C-131-05505	4B-E7	2049-04	7-9 N OF C5	0-6 E OF CF	21349	INACCESSIBLE
C238	C-0C3902	C-131-05505	4B-E7	2071-00	5-3 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C239	C-0C3902	C-131-05505	4B-E7	2060-02	5-3 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C240	C-0C3902	C-131-05505	4B-E7	2060-02	5-3 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C241	C-0C3902	C-131-05505	4B-E7	2049-04	5-3 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C242	C-0C3902	C-131-05505	4B-E7	2071-00	0-11 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C243	C-0C3902	C-131-05505	4B-E7	2060-02	0-11 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C244	C-0C3902	C-131-05505	4B-E7	2060-02	0-11 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C245	C-0C3902	C-131-05505	4B-E7	2049-04	0-11 S OF C4	0-6 E OF CF	21349	INACCESSIBLE
C246	C-0C3902	C-131-05505	4B-E7	2071-00	1-0 N OF C4	0-6 E OF CF	21349	INACCESSIBLE
C247	C-0C3902	C-131-05505	4B-E7	2060-02	1-0 N OF C4	0-6 E OF CF	21349	INACCESSIBLE
C248	C-0C3902	C-131-05505	4B-E7	2060-02	1-0 N OF C4	0-6 E OF CF	21349	INACCESSIBLE
C249	C-0C3902	C-131-05505	4B-E7	2049-04	1-0 N OF C4	0-6 E OF CF	21349	INACCESSIBLE
C250	C-0C3902	C-131-05505	4B-E7	2071-00	5-8 N OF C4	0-6 E OF CF	21349	INACCESSIBLE
C251	C-0C3902	C-131-05505	4B-E7	2060-02	5-8 N OF C4	0-6 E OF CF	21349	INACCESSIBLE
C252	C-0C3902	C-131-05505	4B-E7	2060-02	5-8 N OF C4	0-6 E OF CF	21349	INACCESSIBLE
C253	C-0C3902	C-131-05505	4B-E7	2049-04	5-8 N OF C4	0-6 E OF CF	21349	INACCESSIBLE

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                                                               E004530
 *                                 STRUCTURAL JOINTS TRACKING                                   AWS WELDING REPORT, APPENDIX A, PAGE 47
 *          BECHTEL
 *JOINT  .  DRAWING  .  ERECTION    .DRAW   .ELEVATON. ---------- LOCATION -------------- .  NCR   .    EVALUATION NO.
 *=======.==========.=============.======.========.===================.==================.=======.=================================================.
   C254     C-0C3111                             2047-06   C3                     9-6 W OF CC       -----    N/A                                  NCR 1SN5847C
   C255     C-0C3111                             2047-06   C3                     7-6 W OF CC       -----    N/A                                  NCR 1SN5847C
   C256     C-0S3711   C-121-01420   E6          2073-06   27-0 N OF C8           5-6 W OF CA       -----    INACCESSIBLE                         FAB REQ. 50
   C257     C-0S3711   C-121-01420   E6          2073-06   32-0 N OF C8           5-6 W OF CA       -----    INACCESSIBLE                         FAB REQ. 50
   C258     C-0S3211   C-121-01426   E1          1984-00   13-6 N OF C8           11-0 E OF CC      21395    C392                                 NCR 1-0238C
   C259     C-0S3211   C-121-01426   E1          1984-00   21-3 N OF C8           11-0 E OF CC      21395    C393                                 NCR 1-0238C
   CA       C-0S3311   C-121-01408   E002        2000-00   C5                     1-6 E OF CF       20566    C006
   CB       C-0S3511   C-121-01414   E004        2032-00   8-0 N OF C3            0-6 E OF CF       -----    N/A
   CC       C-0S3511   C-121-01414   E004        2032-00   9-0 S OF C1            0-6 E OF CF       -----    N/A
   CD       C-0S3611   C-121-01417   E005        2047-06   C7                     0-6 E OF CF       20566    C003
   CE       C-0S3611   C-121-01417   E005        2047-06   C5                     0-6 E OF CF       20566    C004/C005
   CF       C-0S3611   C-121-01417   E005        2047-06   C7                     2-0 W OF CA       20566    C001/C002
                    ..... END REPORT .....
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                                                                        E004530
*                                      STRUCTURAL JOINTS TRACKING                        AWS WELDING REPORT, APPENDIX A, PAGE 48
*          BECHTEL
*JOINT . DRAWING  .  ERECTION   .DRAW  .ELEVATON. ----------- LOCATION ------------ .  NCR  .   EVALUATION NO.
*------.----------.-------------.------.---------.-----------------------------------.-------.--------------------------------------------.
 D001    C-0S5211   C-121-08958  E002   2029-07  1-0 N OF D6        3-3 W OF DB      20865   D012/D013
 D002    C-0S5211   C-121-08958  E002   2029-07  1-0 N OF D6        3-9 W OF DA      20865   D014/D015
 D003    C-0S5213   C-121-08840  E008   2031-02  10-6 S OF D1       1-0 E OF DB      21198   D016/D017
 D004    C-0S5213   C-121-08840  E003   2031-02  0-6 S OF D1        1-0 E OF DB      21198   D018/D019
 D005    C-0S5213   C-121-08840  E008   2045-06  3-1 S OF D2        24-3 E OF DC     21198   D069
 D006    C-0S5213   C-121-08861  E007   2016-02  7-0 N OF D28       0-6 E OF DC      21178   D063
 D007    C-0S5311   C-121-08831  E003   2047-02  D3                 0-6 E OF DC      21186   D071/D101
 D008    C-0S5311   C-121-08831  E003   2047-02  D2                 0-6 E OF DC      21186   D072/D073
 D009    C-0S5311   C-121-08831  E003   2047-02  7-0 N OF D2        0-6 E OF DC      21186   D074
 D010    C-0S5311   C-121-08831  E003   2047-02  D5                 1-0 W OF DB      21186   D075
 D011    C-0S5311   C-121-08831  E003   2047-02  7-0 N OF D2        1-0 W OF DB      21186   D076/D077
 D012    C-0S5311   C-121-08831  E003   2047-02  7-0 N OF D2        1-0 E OF DB      21186   D070
 D013    C-0S5213   C-121-08861  E009   2016-02  D2                 0-6 E OF DC      ------  N/A
 D014    C-0S5213   C-121-08861  E009   2016-02  D28                1-0 E OF DB      ------  N/A
 D015    C-0S5213   C-121-08861  E009   2016-02  7-0 N OF D28       1-0 E OF DB      ------  N/A
 D016    C-0S5213   C-121-08840  E003   2031-02  10-6 S OF D1       0-6 E OF DC      ------  N/A
 D017    C-0S5213   C-121-08840  E008   2031-02  0-6 S OF D1        0-6 E OF DC      ------  N/A
 D018    C-0S5213   C-121-08840  E003   2045-06  3-1 S OF D2        24-9 E OF DB     21178   D020
 D019    C-0S5211   C-121-08958  E002   2029-07  1-0 N OF D6        15-9 W OF DB     ------  N/A
 D020    C-0S5211   C-121-08958  E002   2029-07  D5                 0-6 E OF DC      21208   D021/D022
 D021    C-0S5211   C-121-08958  E002   2029-07  D3                 0-6 E OF DC      21208   D023/D024
 D022    C-0S5211   C-121-08958  E002   2027-07  D4                 1-0 W OF DB      21208   VOID                               SAME AS JOINT DA
 D023    C-0S5211   C-121-08958  E002   2029-07  D2                 1-0 W OF DB      ------  N/A
 D024    C-0S5211   C-121-08758  E002   2029-07  1-0 N OF D6        12-3 W OF DA     21208   D066
 D025    C-0S5211   C-121-08958  E002   2029-07  D5                 1-0 E OF DB      21208   D046
 D026    C-0S5211   C-121-08958  E002   2027-07  D3                 1-0 E OF DB      21208   D047
 D027    C-0S5311   C-121-08831  E003   2047-02  D5                 0-6 E OF DC      21186   D078/D079
 D028    C-0S5311   C-121-08831  E003   2047-02  6-6 N OF D5        0-6 E OF DC      21186   D080/D081
 D029    C-0S5311   C-121-08831  E003   2047-02  6-6 S OF D3        1-0 W OF DB      21186   D082/D083
 D030    C-0S5311   C-121-08831  E003   2047-02  6-6 S OF D3        0-6 E OF DC      21186   D084/D085
 D031    C-0S5311   C-121-08831  E003   2047-02  D5                 1-0 E OF DB      21186   D050/D051
 D032    C-0S5311   C-121-08831  E003   2047-02  6-6 N OF D5        1-0 E OF DB      21186   D052/D053
 D033    C-0S5311   C-121-08831  E003   2047-02  6-6 S OF D3        1-0 E OF DB      21186   D054/D055
 D034    C-0S5311   C-121-08831  E003   2047-02  D2                 1-0 E OF DB      21186   D056/D057
 D035    C-0S5311   C-121-08831  E003   2047-02  D3                 1-0 E OF DB      21186   D058/D059
 D036    C-0S5311   C-121-08831  E003   2047-02  D3                 1-0 W OF DB      21186   D086/D087
 D037    C-0S5311   C-121-08831  E003   2047-02  D2                 1-0 W OF DB      21186   D088/D089
 D038    C-0S5311   C-121-08831  E003   2047-02  D1                 0-6 E OF DC      21186   D070
 D039    C-0S5311   C-121-08831  E003   2047-02  7-0 N OF D2        12-2 E OF DC     ------  N/A
 D040    C-0S5311   C-121-08831  E003   2047-02  D1                 12-2 E OF DC     21186   D072
 D041    C-0S5311   C-121-08831  E003   2047-02  7-0 N OF D2        8-8 W OF DB      ------  N/A
 D042    C-0S5311   C-121-08831  E003   2047-02  D1                 3-3 W OF DB      ------  N/A
 D043    C-0S5311   C-121-08831  E003   2047-02  D1                 1-0 W OF DB      21186   D093/D094
 D044    C-0S5311   C-121-08831  E003   2047-02  D1                 1-0 E OF DB      21186   D060/D061
 D045    C-0S5311   C-121-08831  E003   2047-02  7-0 N OF D2        12-8 E OF DB     ------  N/A
 D046    C-0S5311   C-121-08831  E003   2047-02  D1                 12-8 E OF DB     ------  N//A
 D047    C-0S5311   C-121-08831  E003   2047-02  7-0 N OF D2        5-2 W OF DA      21186   D062
 D048    C-0S5311   C-121-08831  E003   2047-02  D1                 5-2 W OF DA      21186   D063
 D049    C-0S5211   C-121-08958  E002   2027-09  1-0 N OF D6        1-6 E OF DC      21208   D067
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*                                 STRUCTURAL JOINTS TRACKING                                     AWS WELDING REPORT, APPENDIX A, PAGE 49
*          BECHTEL
*JOINT  .  DRAWING  .  ERECTION   .DRAW   .ELEVATON. ----------- LOCATION -------------.  NCR   .   EVALUATION NO.
*=======.===========.=============.=======.=========.=================.=================.=======.===========================================.
  D050     C-0S5211    C-121-08958   E002    2029-07   D4                 0-6 E OF DC      21208   D097
  D051     C-0S5211    C-121-08958   E002    2029-07   D2                 0-6 E OF DC      21208   D078/D097
  D052     C-0S5211    C-121-08958   E002    2027-09   1-0 N OF D6        5-3 W OF DB      ------  N/A
  D053     C-0S5211    C-121-08958   E002    2029-07   1-0 N OF D6        4-3 W OF DB      21208   D025
  D054     C-0S5211    C-121-08958   E002    2029-07   D5                 1-0 W OF DB      21208   D100
  D055     C-0S5211    C-121-08958   E002    2029-07   D3                 1-0 W OF DB      ------  N/A
  D056     C-0S5211    C-121-08958   E002    2027-09   1-0 N OF D6        2-0 E OF DB      21208   D026
  D057     C-0S5211    C-121-08958   E002    2029-07   D4                 1-0 E OF DB      21208   D048
  D058     C-0S5211    C-121-08958   E002    2029-07   D2                 1-0 E OF DB      21208   D049
  D059     C-0S5211    C-121-08958   E002    2027-09   1-0 N OF D6        1-9 W OF DA      21208   D027
  D060     C-0S5211    C-121-08958   E002    2029-07   1-0 N OF D6        DA               21208   D028
  D061     C-0S5901    C-121-13249   E004    2022-09   1-0 N OF D6        DA               20850   D029
  D062     C-0S5212    C-121-08900   E007    2009-08   8-6 S OF D4        1-0 E OF DB      20851   D030
  D063     C-0S5212    C-121-08900   E007    2006-01   8-6 S OF D4        1-0 E OF DB      ------  N/A
  D064     C-0S5212    C-121-08900   E007    2009-08   5-6 N OF D4        1-0 E OF DB      20851   D031
  D065     C-0S5212    C-121-08900   E007    2006-01   5-6 N OF D4        1-0 E OF DB      ------  N/A
  D066     C-0S5212    C-121-08900   E007    2009-08   10-2 N OF D4       1-0 E OF DB      20851   D032
  D067     C-0S5212    C-121-08900   E007    2006-01   10-2 N OF D4       1-0 E OF DB      ------  N/A
  D068     C-0S5212    C-121-08900   E007    2009-08   8-6 S OF D4        0-6 E OF DC      20851   D033
  D069     C-0S5212    C-121-08900   E007    2006-01   8-6 S OF D4        0-6 E OF DC      20851   D034
  D070     C-0S5212    C-121-08900   E007    2009-08   5-6 N OF D4        0-6 E OF DC      20851   D035
  D071     C-0S5212    C-121-08900   E007    2006-01   5-6 N OF D4        0-6 E OF DC      20851   D036
  D072     C-0S5212    C-121-08900   E007    2009-08   10-2 N OF D4       0-6 E OF DC      20851   D037
  D073     C-0S5212    C-121-08900   E007    2006-01   10-2 N OF D4       0-6 E OF DC      20851   D038
  D074     C-0S5311    C-121-08831   E003    2047-02   6-6 N OF D5        1-0 W OF DB      21186   D095/D097
  D075     C-0S5311    C-121-08831   E003    2047-02   1-0 N OF D6        DA               21186   D064
  D076     C-0S5212    C-121-08899   E006    2019-03   1-10 N OF D6       0-6 E OF DC      20868   D040
  D077     C-0S5212    C-121-08899   E006    2019-03   4-0 N OF D6        0-6 E OF DC      ------  N/A
  D078     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        11-0 E OF DC     20868   D041
  D079     C-0S5212    C-121-08899   E006    2016-03   1-0 N OF D6        11-0 E OF DC     ------  N/A
  D080     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        11-6 W OF DB     ------  N/A
  D081     C-0S5212    C-121-08899   E006    2016-03   1-0 N OF D6        11-6 W OF DB     ------  N/A
  D082     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        8-6 W OF DB      ------  N/A
  D083     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        4-6 W OF DB      ------  N/A
  D084     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        1-10 W OF DB     ------  N/A
  D085     C-0S5212    C-121-08899   E006    2019-03   6-6 N OF D6        1-0 W OF DB      20868   D042
  D086     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        3-0 E OF DB      20867   D043
  D087     C-0S5212    C-121-08899   E006    2016-03   1-0 N OF D6        3-0 E OF DB      20868   D044
  D088     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        15-9 E OF DB     20868   D045
  D089     C-0S5212    C-121-08899   E006    2016-03   1-0 N OF D6        15-9 E OF DB     20868   D039
  D090     C-0S5212    C-121-08899   E006    2019-03   1-0 N OF D6        1-0 W OF DA      ------  N/A
  D091     C-0S5212    C-121-08899   E006    2016-03   1-0 N OF D6        1-0 W OF DA      ------  N/A
  D092     C-0S5213    C-121-08840   E008    2045-06   3-1 S OF D2        12-3 E OF DC     21307   D102
  D093     C-0S5213    C-121-08840   E003    2045-06   3-1 S OF D2        12-9 E OF DB     21307   D103
  DA       C-0S5211    C-121-08958   E002    2029-07   D4                 1-0 W OF DB      ------  N/A
  DB       C-0S5213    C-121-08861   E007    2016-02   D2                 1-0 E OF DB      20565   D009/D010/D011
  DC       C-0S5213    C-121-08861   E009    2016-02   D2.8               0-6 E OF DC      20565   D007/D008
  DD       C-0S5311    C-121-08831   E003    2047-02   D4                 1-0 E OF DB      20565   D001/D002
  DE       C-0S5311    C-121-08831   E003    2047-02   D4                 1-0 W OF DB      20565   D003/D004
  DF       C-0S5311    C-121-08831   E003    2047-02   D4                 0-6 E OF DC      20565   D005/D006
                 ----- END REPORT -----
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.DATE 27 DEC 84  17:31:23  RID      1    01 DEC 84  BECHTEL
                                                                  E004530
*                                 STRUCTURAL JOINTS TRACKING                         AWS WELDING REPORT, APPENDIX A. PAGE 50
*          BECHTEL
*JOINT . DRAWING .  ERECTION  .DRAW  .ELEVATON. ---------- LOCATION ------------ .  NCR  .   EVALUATION NO.
*******.*********.************.******.*********.*************************.**********.*******.****************************************.
 F001   C-0S6311  C-121-19001  E002   2047-06  7-9 N OF F7          8-4 W OF FC       20986   F060/F061
 F002   C-0S6311  C-121-19001  E002   2047-06  F6                   8-4 W OF FC       20986   F062/F063/F115
 F003   C-0S6311  C-121-19001  E002   2047-06  7-6 N OF F6          8-4 W OF FC       20986   F064/F065
 F004   C-0S6311  C-121-19001  E002   2047-06  7-9 S OF F5          8-4 W OF FC       20986   F066/F067
 F005   C-0S6211  C-121-19027  E003   2026-00  2-0 S OF F1          1-0 E OF FD       20849   F051
 F006   C-0S6211  C-121-19027  E003   2026-00  9-4 S OF F1          1-0 E OF FD       20849   F018
 F007   C-0S6211  C-121-19027  E003   2026-00  5-10 N OF F2         1-0 E OF FD       20849   F019/F020
 F008   C-0S6211  C-121-19027  E003   2026-00  F2                   4-0 E OF FD       20849   F021
 F009   C-0S6211  C-121-19027  E003   2026-00  6-8 S OF F2          1-0 E OF FD       20849   F022/F023
 F010   C-0S6211  C-121-19027  E003   2026-00  6-8 N OF F3          1-0 E OF FD       20848   F024/F025
 F011   C-0S6211  C-121-19027  E003   2026-00  6-8 S OF F3          1-0 E OF FD       20849   F026
 F012   C-0S6211  C-121-19027  E003   2026-00  6-8 N OF F4          1-0 E OF FD       20849   F027
 F013   C-0S6211  C-121-19027  E003   2026-00  6-4 S OF F4          1-0 E OF FD       20849   F028
 F014   C-0S6211  C-121-19027  E003   2026-00  7-4 N OF F5          1-0 E OF FD       20849   F029
 F015   C-0S6211  C-121-19027  E003   2026-00  1-0 S OF F5          9-4 W OF FC       20849   F030
 F016   C-0S6211  C-121-19027  E003   2026-00  F6                   9-4 W OF FC       20849   F015/F016
 F017   C-0S6211  C-121-19027  E003   2026-00  1-6 S OF F6          8-4 W OF FC       20849   F010/F011
 F018   C-0S6211  C-121-19027  E003   2026-00  7-4 N OF F7          8-4 W OF FC       20849   F012
 F019   C-0S6211  C-121-19027  E003   2026-00  4-0 N OF F7          FC                20849   F014
 F020   C-0S6211  C-121-19027  E003   2026-00  F4                   4-0 E OF FD       20849   F017
 F021   C-0S6511  C-121-19029  E005   2083-06  F6                   5-3 E OF FD       20864   F032/F033
 F022   C-0S6511  C-121-19029  E005   2083-06  1-0 N OF F7          5-3 E OF FD       20864   F034/F035/F036
 F023   C-0S6511  C-121-19029  E005   2083-06  1-0 N OF F7          5-3 W OF FA       20864   F037/F038/F039
 F024   C-0S6311  C-121-19029  E005   2083-06  F6                   5-3 W OF FA       -----   VOID              NO WELD REQUIRED
 F025   C-0S6511  C-121-12029  E005   2083-06  6-6 S OF F5          1-0 W OF FA       -----   N/A
 F026   C-0S6511  C-121-12029  E005   2083-06  3-10 S OF F2         5-3 W OF FA       -----   N/A
 F027   C-0S6511  C-121-12029  E005   2083-06  2-2 S OF F2          5-3 W OF FA       -----   VOID              SAME AS FG47
 F028   C-0S6311  C-121-12029  E005   2083-06  1-10 N OF F2         5-3 W OF FA       -----   VOID              SAME AS FG45
 F029   C-0S6511  C-121-12029  E005   2083-06  1-0 S OF F1          5-3 W OF FA       20911   F042/F043
 F030   C-0S6511  C-121-19029  E005   2083-06  11-3 N OF F4         5-3 E OF FD       -----   N/A
 F031   C-0S6511  C-121-19029  E005   2083-06  2-1 N OF F4          5-3 E OF FD       -----   N/A
 F032   C-0S6005  C-121-19069  E007   2082-07  1-0 N OF F7          7-6 E OF FB       20889   F111/F112
 F033   C-0S6005  C-121-19069  E007   2073-02  1-0 N OF F1          2-0 W OF FC       20888   F113/F114
 F034   C-0S6005  C-121-19069  E007   2073-02  1-0 N OF F1          6-0 E OF FC       21353   F126/F127
 F035   C-0S6005  C-121-19069  E007   2073-02  16-6 N OF F1         2-0 W OF FC       -----   N/A
 F036   C-0S6005  C-121-19078  E010   2026-00  0-6 S OF F5          1-7 E OF FC       20882   F047
 F037   C-0S6005  C-121-19078  E010   2026-00  4-0 N OF F5          1-7 E OF FC       20883   F048
 F038   C-0S6005  C-121-19078  E010   2026-00  4-0 N OF F5          5-7 E OF FC       20883   F049
 F039   C-0S6005  C-121-19078  E010   2021-00  4-0 N OF F5          5-7 E OF FC       -----   N/A
 F040   C-0S6005  C-121-19078  E010   2057-06  13-6 S OF F4         1-0 W OF FA       -----   N/A
 F041   C-0S6005  C-121-19078  E010   2052-01  13-6 S OF F4         1-0 W OF FA       -----   N/A
 F042   C-0S6005  C-121-19078  E010   2057-06  2-0 S OF F4          1-0 W OF FA       20883   F050
 F043   C-0S6005  C-121-19078  E010   2052-01  2-0 S OF F4          1-0 W OF FA       -----   N/A
 F044   C-0S6311  C-121-19001  E002   2047-06  6-8 N OF F5          1-0 E OF FD       20893   F067/F070
 F045   C-0S6211  C-121-19027  E003   2026-00  F6                   7-3 E OF FD       20848   F056/F057
 F046   C-0S6211  C-121-19027  E003   2026-00  1-0 S OF F5          7-3 E OF FD       -----   N/A
 F047   C-0S6211  C-121-19027  E003   2026-00  F6                   13-5 E OF FD      20869   F058
 F048   C-0S6311  C-121-19001  E002   2047-06  6-8 S OF F4          1-0 E OF FD       -----   N/A
 F049   C-0S6211  C-121-19027  E003   2026-00  F6                   15-6 W OF FC      -----   N/A
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STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
F050	C-0S6211	C-121-19027	E003	2026-00	1-0 S OF F5	15-6 W OF FC	------	N/A
F051	C-0S6211	C-121-19027	E003	2026-00	1-0 S OF F5	FC	20848	F059
F052	C-0S6211	C-121-19027	E003	2026-00	7-4 N OF F5	3-0 W OF FC	------	N/A
F053	C-0S6211	C-121-19027	E003	2026-00	6-4 S OF F4	3-0 W OF FC	------	N/A
F054	C-0S6211	C-121-19027	E003	2026-00	F4	3-0 W OF FC	------	N/A
F055	C-0S6211	C-121-19027	E003	2026-00	6-8 N OF F4	3-0 W OF FC	------	N/A
F056	C-0S6211	C-121-19027	E003	2026-00	6-8 S OF F3	3-0 W OF FC	------	N/A
F057	C-0S6211	C-121-19027	E003	2026-00	F3	3-0 W OF FC	------	N/A
F058	C-0S6211	C-121-19027	E003	2026-00	6-8 N OF F3	3-0 W OF FC	------	N/A
F059	C-0S6211	C-121-19027	E003	2026-00	6-8 S OF F2	3-0 W OF FC	------	N/A
F060	C-0S6211	C-121-19027	E003	2026-00	F2	3-0 W OF FC	------	N/A
F061	C-0S6211	C-121-19027	E003	2026-00	5-10 N OF F2	3-0 W OF FC	------	N/A
F062	C-0S6211	C-121-19027	E003	2026-00	9-4 S OF F1	3-10 W OF FC	------	N/A
F063	C-0S6211	C-121-19027	E003	2026-00	2-0 S OF F1	3-10 W OF FC	------	N/A
F064	C-0S6311	C-121-19001	E002	2047-06	F4	4-0 E OF FD	20893	F071
F065	C-0S6311	C-121-19001	E002	2047-06	6-4 N OF F4	1-0 E OF FD	20893	F072/F073
F066	C-0S6311	C-121-19001	E002	2047-06	6-8 S OF F3	1-0 E OF FD	20893	F074
F067	C-0S6311	C-121-19001	E002	2047-06	F3	4-0 E OF FD	20893	F075/F076
F068	C-0S6311	C-121-19001	E002	2047-06	7-0 N OF F3	1-0 E OF FD	20893	F077/F078
F069	C-0S6311	C-121-19001	E002	2047-06	6-8 S OF F2	1-0 E OF FD	20893	F079/F080
F070	C-0S6311	C-121-19001	E002	2047-06	F2	4-0 E OF FD	20893	F081/F082
F071	C-0S6311	C-121-19001	E002	2047-06	7-0 N OF F2	1-0 E OF FD	20893	F083/F084
F072	C-0S6311	C-121-19001	E002	2047-06	2-0 S OF F1	1-0 E OF FD	20893	F085
F073	C-0S6311	C-121-19001	E002	2047-06	4-0 N OF F7	FC	------	N/A
F074	C-0S6311	C-121-19001	E002	2047-06	1-0 S OF F5	FC	20893	F086
F075	C-0S6311	C-121-19001	E002	2047-06	6-8 N OF F5	3-0 W OF FC	20893	F087
F076	C-0S6311	C-121-19001	E002	2047-06	6-8 S OF F4	3-0 W OF FC	20893	F088
F077	C-0S6311	C-121-19001	E002	2047-06	F4	3-0 W OF FC	------	N/A
F078	C-0S6311	C-121-19001	E002	2047-06	6-4 N OF F4	3-0 W OF FC	20893	F089
F079	C-0S6311	C-121-19001	E002	2047-06	6-8 S OF F3	3-0 W OF FC	------	N/A
F080	C-0S6311	C-121-19001	E002	2047-06	F3	3-0 W OF FC	20893	F090
F081	C-0S6311	C-121-19001	E002	2047-06	7-0 N OF F3	3-0 W OF FC	20893	F091
F082	C-0S6311	C-121-19001	E002	2047-06	6-8 S OF F2	3-0 W OF FC	20893	F092
F083	C-0S6311	C-121-19001	E002	2047-06	F2	3-0 W OF FC	20893	F093
F084	C-0S6311	C-121-19001	E002	2047-06	7-0 N OF F2	3-0 W OF FC	20893	F094
F085	C-0S6311	C-121-19001	E002	2047-06	8-9 S OF F1	3-0 W OF FC	20893	F095
F086	C-0S6311	C-121-19001	E002	2047-06	2-0 S OF F1	3-0 W OF FC	20893	F096
F087	C-0S6311	C-121-19001	E002	2047-06	1-0 N OF F7	7-0 E OF FC	20893	F097
F088	C-0S6311	C- 21-19001	E002	2047-06	1-0 N OF F7	7-0 W OF FB	20893	F098/F099/F100
F089	C-0S6311	C-121-19001	E002	2047-06	1-0 N OF F7	5-9 E OF FB	20893	F101/F102
F090	C-0S6311	C-121-19001	E002	2047-06	1-0 N OF F7	11-6 E OF FB	20893	F103/F104/F105
F091	C-0S6311	C-121-19001	E002	2047-06	1-0 N OF F7	6-6 W OF FA	20893	F106/F107/F125
F092	C-0S6311	C-121-19001	E002	2047-06	4-0 N OF F5	FB	20893	F108
F093	C-0S6311	C-121-19001	E002	2047-06	4-0 N OF F5	5-9 E OF FB	20893	F109
F094	C-0S6311	C-121-19001	E002	2047-06	4-0 N OF F5	11-6 E OF FB	20893	F110
F095	C-0S6311	C-121-19001	E002	2047-06	4-0 N OF F5	6-6 W OF FA	------	N/A
F096	C-0S6312	C-131-05765	E004	2048-06	1-0 S OF F5	17-11 E OF FD	------	N/A
F097	C-0S6312	C-131-05765	E004	2048-06	F6	25-0 E OF FD	------	N/A
F098	C-0S6312	C-131-05765	E004	2048-06	1-0 S OF F5	25-0 E OF FD	------	N/A
F099	C-0S6411	C-121-19030	E006	2065-00	F3	4-0 E OF FD	20876	F044
F100	C-0S6411	C-121-19030	E006	2065-00	8-0 N OF F3	1-0 E OF FD	20876	F045

E004530

STRUCTURAL JOINTS TRACKING

JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.
F101	C-0S6411	C-121-19030	E006	2065-00	4-0 S OF F2	1-0 E OF FD	-----	N/A
F102	C-0S6411	C-121-19030	E006	2065-00	4-2 N OF F2	1-0 E OF FD	-----	N/A
F103	C-0S6411	C-121-19030	E006	2065-00	10-2 S OF F1	1-0 E OF FD	20876	F046
F104	C-0S6411	C-121-19030	E006	2065-00	2-0 S OF F1	1-0 E OF FD	-----	N/A
F105	C-0S6511	C-121-19029	E005	2083-06	6-6 N OF F9	1-0 E OF FD	-----	N/A
F106	C-0S6511	C-121-19029	E005	2083-06	2-6 S OF F6	1-0 E OF FD	-----	N/A
F107	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F6	1-0 E OF FD	-----	N/A
F108	C-0S6511	C-121-19029	E005	2083-06	9-0 N OF F6	1-0 E OF FD	-----	N/A
F109	C-0S6511	C-121-19029	E005	2083-06	6-6 S OF F5	1-0 E OF FD	-----	N/A
F110	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F5	1-0 E OF FD	-----	N/A
F111	C-0S6511	C-121-19029	E005	2083-06	8-4 N OF F6	1-0 E OF FD	21104	F116
F112	C-0S6511	C-121-19029	E005	2083-06	5-10 S OF F4	1-0 E OF FD	-----	N/A
F113	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F4	1-0 E OF FD	-----	N/A
F114	C-0S6511	C-121-19029	E005	2083-06	8-4 N OF F4	1-0 E OF FD	-----	N/A
F115	C-0S6511	C-121-19029	E005	2083-06	5-10 S OF F3	1-0 E OF FD	-----	N/A
F116	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F3	1-0 E OF FD	-----	N/A
F117	C-0S6511	C-121-19029	E005	2083-06	8-4 N OF F3	1-0 E OF FD	20946	F124
F118	C-0S6511	C-121-19029	E005	2083-06	5-10 S OF F2	1-0 E OF FD	-----	N/A
F119	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F2	1-0 E OF FD	-----	N/A
F120	C-0S6511	C-121-19029	E005	2083-06	9-2 N OF F2	1-0 E OF FD	-----	N/A
F121	C-0S6511	C-121-19029	E005	2083-06	6-8 S OF F1	1-0 E OF FD	-----	N/A
F122	C-0S6511	C-121-19029	E005	2083-06	6-6 N OF F7	5-3 E OF FD	-----	N/A
F123	C-0S6511	C-121-19029	E005	2083-06	2-6 S OF F6	5-3 E OF FD	-----	N/A
F124	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F6	5-3 E OF FD	-----	N/A
F125	C-0S6511	C-121-19029	E005	2083-06	9-0 N OF F6	5-3 E OF FD	-----	N/A
F126	C-0S6511	C-121-19029	E005	2083-06	6-6 S OF F5	5-3 E OF FD	-----	N/A
F127	C-0S6511	C-121-19029	E005	2083-06	F5	5-3 E OF FD	-----	N/A
F128	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F5	5-3 E OF FD	-----	N/A
F129	C-0S6511	C-121-19029	E005	2083-06	8-4 N OF F5	5-3 E OF FD	-----	N/A
F130	C-0S6511	C-121-19029	E005	2083-06	5-10 S OF F4	5-3 E OF FD	-----	N/A
F131	C-0S6511	C-121-19029	E005	2083-06	F4	5-3 E OF FD	-----	N/A
F132	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F4	5-3 E OF FD	-----	N/A
F133	C-0S6511	C-121-19029	E005	2083-06	8-4 N OF F4	5-3 E OF FD	-----	N/A
F134	C-0S6511	C-121-19029	E005	2083-06	5-10 S OF F3	5-3 E OF FD	-----	N/A
F135	C-0S6511	C-121-19029	E005	2083-06	F3	5-3 E OF FD	-----	N/A
F136	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F3	5-3 E OF FD	-----	N/A
F137	C-0S6511	C-121-19029	E005	2083-06	8-4 N OF F3	5-3 E OF FD	-----	N/A
F138	C-0S6511	C-121-19029	E005	2083-06	5-10 S OF F2	5-3 E OF FD	-----	N/A
F139	C-0S6511	C-121-19029	E005	2083-06	F2	5-3 E OF FD	-----	N/A
F140	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F2	5-3 E OF FD	-----	N/A
F141	C-0S6511	C-121-19029	E005	2083-06	9-2 N OF F2	5-3 E OF FD	-----	N/A
F142	C-0S6511	C-121-19029	E005	2083-06	6-8 S OF F1	5-3 E OF FD	-----	N/A
F143	C-0S6511	C-121-19029	E005	2083-06	1-0 S OF F1	5-3 E OF FD	20946	F117/F118
F144	C-0S6511	C-121-19029	E005	2083-06	6-6 N OF F7	5-3 W OF FA	-----	N/A
F145	C-0S6511	C-121-19029	E005	2083-06	2-6 S OF F6	5-3 W OF FA	20946	F119
F146	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F6	5-3 W OF FA	-----	N/A
F147	C-0S6511	C-121-19029	E005	2083-06	9-0 N OF F6	5-3 W OF FA	-----	N/A
F148	C-0S6511	C-121-19029	E005	2083-06	6-6 S OF F5	5-3 W OF FA	-----	N/A
F149	C-0S6511	C-121-19029	E005	2083-06	F5	5-3 W OF FA	-----	N/A
F150	C-0S6511	C-121-19029	E005	2083-06	2-6 N OF F5	5-3 W OF FA	-----	N/A
F151	C-0S6511	C-121-19029	E005	2083-06	8-4 N OF F5	5-3 W OF FA	-----	N/A

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.                                                                         E004530
*                                 STRUCTURAL JOINTS TRACKING                                  AWS WELDING REPORT, APPENDIX A, PAGE 53
*           BECHTEL
*JOINT  . DRAWING  .  ERECTION   .DRAW   .ELEVATON. ----------- LOCATION -----------.  NCR  .   EVALUATION NO.
*=======.==========.============.======.========.================.================.=======.==========================================.
 F152     C-0S6511  C-121-19029  E005    2083-06  5-10 S OF F4     5-3 W OF FA       -----   N/A
 F153     C-0S6511  C-121-19029  E005    2083-06  F4               5-3 W OF FA       -----   N/A
 F154     C-0S6511  C-121-19029  E005    2083-06  2-6 N OF F4      5-3 W OF FA       20946   F120
 F155     C-0S6511  C-121-19029  E005    2083-06  8-4 N OF F4      5-3 W OF FA       -----   N/A
 F156     C-0S6511  C-121-19029  E005    2083-06  5-10 S OF F3     5-3 W OF FA       -----   N/A
 F157     C-0S6511  C-121-19029  E005    2083-06  F3               5-3 W OF FA       -----   N/A
 F158     C-0S6511  C-121-19029  E005    2083-06  2-6 N OF F3      5-3 W OF FA       -----   N/A
 F159     C-0S6511  C-121-19029  E005    2083-06  8-4 N OF F3      5-3 W OF FA       -----   N/A
 F160     C-0S6511  C-121-12029  E005    2083-06  F2               5-3 W OF FA       -----   N/A
 F161     C-0S6511  C-121-12029  E005    2083-06  2-6 N OF F2      5-3 W OF FA       -----   N/A
 F162     C-0S6511  C-121-12029  E005    2083-06  9-2 N OF F2      5-3 W OF FA       -----   N/A
 F163     C-0S6511  C-121-12029  E005    2083-06  6-8 S OF F1      5-3 W OF FA       -----   N/A
 F164     C-0S6511  C-121-12029  E005    2083-06  6-6 N OF F7      1-0 W OF FA       -----   N/A
 F165     C-0S6511  C-121-12029  E005    2083-06  2-6 S OF F6      1-0 W OF FA       -----   N/A
 F166     C-0S6511  C-121-12029  E005    2083-06  2-6 N OF F6      1-0 W OF FA       -----   N/A
 F167     C-0S6511  C-121-12029  E005    2083-06  9-0 N OF F6      1-0 W OF FA       -----   N/A
 F168     C-0S6511  C-121-12029  E005    2083-06  6-6 S OF F5      1-0 W OF FA       -----   VOID                    SAME AS F025
 F169     C-0S6511  C-121-12029  E005    2083-06  2-6 N OF F5      1-0 W OF FA       -----   N/A
 F170     C-0S6511  C-121-12029  E005    2083-06  8-4 N OF F5      1-0 W OF FA       20946   F121
 F171     C-0S6511  C-121-12029  E005    2083-06  5-10 S OF F4     1-0 W OF FA       -----   N/A
 F172     C-0S6511  C-121-12029  E005    2083-06  2-6 N OF F4      1-0 W OF FA       -----   N/A
 F173     C-0S6511  C-121-12029  E005    2083-06  8-4 N OF F4      1-0 W OF FA       -----   N/A
 F174     C-0S6511  C-121-12029  E005    2083-06  5-10 S OF F3     1-0 W OF FA       -----   N/A
 F175     C-0S6511  C-121-12029  E005    2083-06  2-6 N OF F3      1-0 W OF FA       -----   N/A
 F176     C-0S6511  C-121-12029  E005    2083-06  8-4 N OF F3      1-0 W OF FA       -----   N/A
 F177     C-0S6511  C-121-12029  E005    2083-06  5-10 S OF F2     1-0 W OF FA       -----   N/A
 F178     C-0S6511  C-121-12029  E005    2083-06  2-6 N OF F2      1-0 W OF FA       -----   N/A
 F179     C-0S6511  C-121-12029  E005    2083-06  9-2 N OF F2      1-0 W OF FA       20946   F122
 F180     C-0S6511  C-121-12029  E005    2083-06  6-8 S OF F1      1-0 W OF FA       20946   F123
 F181     C-0S6312  C-131-05765  E004    2048-06  1-6 N OF F6      3-4 E OF FD       -----   N/A
 F182     C-0S6312  C-131-05765  E004    2048-06  5-0 S OF F5      1-0 E OF FD       -----   N/A
 F183     C-0S6312  C-131-05765  E004    2048-06  1-0 S OF F5      4-6 E OF FD       -----   N/A
 F184     C-0S6312  C-131-05765  E004    2048-06  1-0 S OF F5      5-10 E OF FD      -----   N/A
 F185     C-0S6312  C-131-05765  E004    2048-06  1-0 S OF F5      3-4 E OF FD       -----   N/A
 F186     C-0S6312  C-131-05765  E004    2048-06  1-0 S OF F5      3-4 E OF FD       -----   N/A
 F187     C-0S6312  C-131-05765  E004    2048-06  F6               8-4 E OF FD       -----   N/A
 F188     C-0S6312  C-131-05765  E004    2048-06  F6               10-10 E OF FD     -----   N/A
 F189     C-0S6312  C-131-05765  E004    2048-06  F6               17-11 E OF FD     -----   N/A
 F190     C-0S6005  C-121-19069  E007    2082-07  3-0 N OF F7      1-6 E OF FB       -----   N/A
 F191     C-0S6005  C-121-19069  E007    2082-07  1-0 N OF F7      2-6 E OF FB       -----   N/A
 F192     C-0S6005  C-121-19069  E007    2070-00  1-0 N OF F7      4-3 E OF FB       -----   N/A
 F193     C-0S6005  C-121-19069  E007    2067-00  1-0 N OF F7      4-3 E OF FB       -----   N/A
 F194     C-0S6005  C-121-19069  E007    2070-00  1-0 N OF F7      10-6 E OF FB      -----   N.A
 F195     C-0S6005  C-121-19069  E007    2067-0C  1-0 N OF F7      10-6 E OF FB      -----   N/A
 F196     C-0S6411  C-131-05813  E014    2047-06  1-3 S OF F1      0-11 E OF FC      -----   N/A
 F197     C-0S6411  C-131-05813  E014    2047-06  6-8 N OF F5      0-11 E OF FC      -----   N/A
 F198     C-0S6411  C-131-05813  E014    2047-06  6-8 N OF F5      9-2 N OF FA       -----   N/A
 FA       C-0S6211  C-121-19027  E003    2026-00  1-0 S OF F5      13-5 E OF FD      20569   F007
 FB       C-0S6211  C-121-19027  E003    2026-00  F3               4-0 E OF FB       20569   F068
 FC       C-0S6311  C-121-19001  E002    2047-06  1-0 N OF F7      14-8 W OF FB      20569   F005/F006
 FD       C-0S6311  C-121-19001  E002    2047-06  4-0 N OF F7      FB                20569   F003/F004
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JOINT	BECHTEL DRAWING	ERECTION	DRAW	ELEVATON	LOCATION		NCR	EVALUATION NO.	
FE	C-0S6311	C-121-19001	E002	2047-06	8-9 S OF F1	1-0 E OF FD	20569	F001/F002	
FF	C-0S6312	C-131-05765	E004	2043-06	1-0 S OF F5	10 10 E OF FD	20569	F009	
FG01	C-0S6511	C-121-19029	E005	2083-06	1 S OF F1	5-3 E OF FD	-----	N/A	
FG02	C-0S6511	C-121-19029	E005	2083-06	2 S OF F1	5-3 E OF FD	-----	N/A	
FG03	C-0S6511	C-121-19029	E005	2083-06	3 S OF F1	5-3 E OF FD	-----	N/A	
FG04	C-0S6511	C-121-19029	E005	2083-06	4 S OF F1	5-3 E OF FD	-----	N/A	
FG05	C-0S6511	C-121-19029	E005	2083-06	5 S OF F1	5-3 E OF FD	-----	N/A	
FG06	C-0S6511	C-121-19029	E005	2083-06	6 S OF F1	5-3 E OF FD	-----	N/A	
FG07	C-0S6511	C-121-19029	E005	2083-06	7 S OF F1	5-3 E OF FD	-----	N/A	
FG08	C-0S6511	C-121-19029	E005	2083-06	8 S OF F1	5-3 E OF FD	-----	N/A	
FG09	C-0S6511	C-121-19029	E005	2083-06	9 S OF F1	5-3 E OF FD	-----	N/A	
FG10	C-0S6511	C-121-19029	E005	2083-06	10 S OF F1	5-3 E OF FD	-----	N/A	
FG11	C-0S6511	C-121-19029	E005	2083-06	11 S OF F1	5-3 E OF FD	-----	N/A	
FG12	C-0S6511	C-121-19029	E005	2083-06	12 S OF F1	5-3 E OF FD	-----	N/A	
FG13	C-0S6511	C-121-19029	E005	2083-06	13 S OF F1	5-3 E OF FD	21398	F136	
FG14	C-0S6511	C-121-19029	E005	2083-06	14 S OF F1	5-3 E OF FD	-----	N/A	
FG15	C-0S6511	C-121-19029	E005	2083-06	15 S OF F1	5-3 E OF FD	-----	N/A	
FG16	C-0S6511	C-121-19029	E005	2083-06	16 S OF F1	5-3 E OF FD	-----	N/A	
FG17	C-0S6511	C-121-19029	E005	2083-06	17 S OF F1	5-3 E OF FD	21398	F137	
FG18	C-0S6511	C-121-19029	E005	2083-06	18 S OF F1	5-3 E OF FD	-----	N/A	
FG19	C-0S6511	C-121-19029	E005	2083-06	19 S OF F1	5-3 E OF FD	21270	N/A	
FG20	C-0S6511	C-121-19029	E005	2083-06	20 S OF F1	5-3 E OF FD	21270	VOID	SAME AS F031
FG21	C-0S6511	C-121-19029	E005	2083-06	21 S OF F1	5-3 E OF FD	21270	F132	
FG22	C-0S6511	C-121-19029	E005	2083-06	22 S OF F1	5-3 E OF FD	-----	N/A	
FG23	C-0S6511	C-121-19029	E005	2083-06	23 S OF F1	5-3 E OF FD	-----	VOID	SAME AS F030
FG24	C-0S6511	C-121-19029	E005	2083-06	24 S OF F1	5-3 E OF FD	-----	N/A	
FG25	C-0S6511	C-121-19029	E005	2083-06	25 S OF F1	5-3 E OF FD	-----	N/A	
FG26	C-0S6511	C-121-19029	E005	2083-06	26 S OF F1	5-3 E OF FD	-----	N/A	
FG27	C-0S6511	C-121-19029	E005	2083-06	27 S OF F1	5-3 E OF FD	-----	N/A	
FG28	C-0S6511	C-121-19029	E005	2083-06	28 S OF F1	5-3 E OF FD	-----	N/A	
FG29	C-0S6511	C-121-19029	E005	2083-06	29 S OF F1	5-3 E OF FD	-----	N/A	
FG30	C-0S6511	C-121-19029	E005	2083-06	30 S OF F1	5-3 E OF FD	-----	N/A	
FG31	C-0S6511	C-121-19029	E005	2083-06	31 S OF F1	5-3 E OF FD	-----	N/A	
FG32	C-0S6511	C-121-19029	E005	2083-06	32 S OF F1	5-3 E OF FD	-----	N/A	
FG33	C-0S6511	C-121-19029	E005	2083-06	33 S OF F1	5-3 E OF FD	-----	N/A	
FG34	C-0S6511	C-121-19029	E005	2083-06	34 S OF F1	5-3 E OF FD	-----	N/A	
FG35	C-0S6511	C-121-19029	E005	2083-06	35 S OF F1	5-3 E OF FD	-----	N/A	
FG36	C-0S6511	C-121-19029	E005	2083-06	36 S OF F1	5-3 E OF FD	-----	N/A	
FG37	C-0S6511	C-121-19029	E005	2083-06	37 S OF F1	5-3 E OF FD	-----	N/A	
FG38	C-0S6511	C-121-19029	E005	2083-06	38 S OF F1	5-3 E OF FD	-----	N/A	
FG39	C-0S6511	C-121-19029	E005	2083-06	39 S OF F1	5-3 E OF FD	-----	N/A	
FG40	C-0S6511	C-121-19029	E005	2083-06	40 S OF F1	5-3 E OF FD	-----	N/A	
FG41	C-0S6511	C-121-19029	E005	2083-06	1 S OF F1	5-3 W OF FA	-----	N/A	
FG42	C-0S6511	C-121-19029	E005	2083-06	2 S OF F1	5-3 W OF FA	21270	F129	
FG43	C-0S6511	C-121-19029	E005	2083-06	3 S OF F1	5-3 W OF FA	21270	F130	
FG44	C-0S6511	C-121-19029	E005	2083-06	4 S OF F1	5-3 W OF FA	21270	F134	
FG45	C-0S6511	C-121-19029	E005	2083-06	5 S OF F1	5-3 W OF FA	21270	F133	
FG46	C-0S6511	C-121-19029	E005	2083-06	6 S OF F1	5-3 W OF FA	21270	F135	
FG47	C-0S6511	C-121-19029	E005	2083-06	7 S OF F1	5-3 W OF FA	21270	F135	
FG48	C-0S6511	C-121-19029	E005	2083-06	8 S OF F1	5-3 W OF FA	-----	N/A	
FG49	C-0S6511	C-121-19029	E005	2083-06	9 S OF F1	5-3 W OF FA	-----	N/A	

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 .                                                                        E004530
 *                                STRUCTURAL JOINTS TRACKING                                          AWS WELDING REPORT, APPENDIX A, PAGE 55
 *          BECHTEL
 *JOINT . DRAWING .  ERECTION  .DRAW  .ELEVATON. ----------- LOCATION ------------ .  NCR  .   EVALUATION NO.
 *======.=========.=============.======.========.===============.================.=======.==========================================.
  FG50   C-0S6511  C-121-19029  .E005   2083-06    10 S OF F1        5-3 W OF FA     -----   N/A
  FG51   C-0S6511  C-121-19029  'E005   2083-06    11 S OF F1        5-3 W OF FA     -----   N/A
  FG52   C-0S6511  C-121-19029   E005   2083-06    12 S OF F1        5-3 W OF FA     -----   N/A
  FG53   C-0S6511  C-121-19029   E005   2083-06    13 S OF F1        5-3 W OF FA     -----   N/A
  FG54   C-0S6511  C-121-19029   E005   2083-06    14 S OF F1        5-3 W OF FA     -----   N/A
  FG55   C-0S6511  C-121-19029   E005   2083-06    15 S OF F1        5-3 W OF FA     -----   N/A
  FG56   C-0S6511  C-121-19029   E005   2083-06    16 S OF F1        5-3 W OF FA     21398   F139
  FG57   C-0S6511  C-121-19029   E005   2083-06    17 S OF F1        5-3 W OF FA     21398   F140
  FG58   C-0S6511  C-121-19029   E005   2083-06    18 S OF F1        5-3 W OF FA     21398   F141
  FG59   C-0S6511  C-121-19029   E005   2083-06    19 S OF F1        5-3 W OF FA     -----   N/A
  FG60   C-0S6511  C-121-19029   E005   2083-06    20 S OF F1        5-3 W OF FA     -----   N/A
  FG61   C-0S6511  C-121-19029   E005   2083-06    21 S OF F1        5-3 W OF FA     -----   N/A
  FG62   C-0S6511  C-121-19029   E005   2083-06    22 S OF F1        5-3 W OF FA     -----   N/A
  FG63   C-0S6511  C-121-19029   E005   2083-06    23 S OF F1        5-3 W OF FA     -----   N/A
  FG64   C-0S6511  C-121-19029   E005   2083-06    24 S OF F1        5-3 W OF FA     -----   N/A
  FG65   C-0S6511  C-121-19029   E005   2083-06    25 S OF F1        5-3 W OF FA     -----   N/A
  FG66   C-0S6511  C-121-19029   E005   2083-06    26 S OF F1        5-3 W OF FA     -----   N/A
  FG67   C-0S6511  C-121-19029   E005   2083-06    27 S OF F1        5-3 W OF FA     -----   N/A
  FG68   C-0S6511  C-121-19029   E005   2083-06    28 S OF F1        5-3 W OF FA     -----   N/A
  FG69   C-0S6511  C-121-19029   E005   2083-06    29 S OF F1        5-3 W OF FA     -----   N/A
  FG70   C-0S6511  C-121-19029   E005   2083-06    30 S OF F1        5-3 W OF FA     -----   N/A
  FG71   C-0S6511  C-121-19029   E005   2083-06    31 S OF F1        5-3 W OF FA     -----   N/A
  FG72   C-0S6511  C-121-19029   E005   2083-06    32 S OF F1        5-3 W OF FA     -----   N/A
  FG73   C-0S6511  C-121-19029   E005   2083-06    33 S OF F1        5-3 W OF FA     -----   N/A
  FG74   C-0S6511  C-121-19029   E005   2083-06    34 S OF F1        5-3 W OF FA     -----   N/A
  FG75   C-0S6511  C-121-19029   E005   2083-06    35 S OF F1        5-3 W OF FA     -----   N/A
  FG76   C-0S6511  C-121-19029   E005   2083-06    36 S OF F1       .5-3 W OF FA     -----   N/A
  FG77   C-0S6511  C-121-19029   E005   2083-06    37 S OF F1        5-3 W OF FA     -----   N/A
  FG78   C-0S6511  C-121-19029   E005   2083-06    38 S OF F1        5-3 W OF FA     -----   N/A
  FG79   C-0S6511  C-121-19029   E005   2083-06    39 S OF F1        5-3 W OF FA     -----   N/A
                   ..... END REPORT .....
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.DATE 27 DEC 84  17:31:23  RID       1    01 DEC 84  BECHTEL
.                                                                  E004530
*                             STRUCTURAL JOINTS TRACKING
*        BECHTEL
*JOINT . DRAWING .  ERECTION  .DRAW  .ELEVATON. ---------- LOCATION ----------- .  NCR  .   EVALUATION NO.
*======.========.============.======.========.================.================.=======.========================================.
 P001    C-KS301   C-131-05381  E4     2000-00                                       20989   P001
 P002    C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 P003    C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 P004    C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 P005    C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 P006    C-KS301   C-131-05381  E4     2000-00                                       20990   P002
 P007    C-KS301   C-131-05381  E4     2000-00                                       20989   P003
 P008    C-KS301   C-131-05381  E4     2000-00                                       20989   P004
 P009    C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 P010    C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 P011    C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 P012    C-KS301   C-131-05381  E4     2000-00                                       20989   P005
 P013    C-KS301   C-131-05412  E201   2000-00                                       20987   P006
 P014    C-KS301   C-131-05412  E201   2000-00                                       20987   P007
 P015    C-KS301   C-131-05412  E201   2000-00                                       20987   P008
 P016    C-KS301   C-131-05412  E201   2000-00                                       20988   P009
 P017    C-KS301   C-131-05381  E4     2000-00                                       21341   P010
 P018    C-KS301   C-131-05381  E4     2000-00                                       21341   P011
 P019    C-KS301   C-131-05381  E4     2000-00                                       21341   P012
 P020    C-KS301   C-131-05381  E4     2000-00                                       21341   P013
 P021    C-KS301   C-131-05412  E201   2000-00                                       21340   P014
 P022    C-KS301   C-131-05412  E201   2000-00                                       21340   P015
 P023    C-KS301   C-131-05382  E5     2009-00                                       21339   P016
 P024    C-KS301   C-131-05382  E5     2005-03                                       21339   P017/P018
 P025    C-KS301   C-131-05382  E5     2009-00                                       21339   P019
 P026    C-KS301   C-131-05382  E5     2005-03                                       21339   P020
 P027    C-KS301   C-131-05382  E5     2009-00                                       21339   P021
 P028    C-KS301   C-131-05382  E5     2005-08                                       21339   P022
 P029    C-KS301   C-131-05382  E5     2009-00                                       21339   P023
 P030    C-KS301   C-131-05382  E5     2005-08                                       21339   P024
 PA      C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 PB      C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 PC      C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 PD      C-KS301   C-131-05381  E4     2000-00                                       -----   N/A
 PE      C-KS301   C-131-05412  E201   2000-00                                       -----   N/A
 PF      C-KS301   C-131-05412  E201   2000-00                                       -----   N/A
                         ..... END REPORT .....
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.DATE 27 DEC 84  17:31:23  RID      1    01 DEC 84  BECHTEL
.                                                                     E004536
*                              STRUCTURAL JOINTS TRACKING                              AWS WELDING REPORT, APPENDIX A, PAGE 56
*         BECHTEL
*JOINT . DRAWING .  ERECTION  .DRAW  .ELEVATON. ---------- LOCATION ------------ .  NCR  .   EVALUATION NO.
*******.*********.************.******.*********.*******************************.*******.*****************************************.
 P001   C-KS301   C-131-05381  E4     2000-00                                      20989   P001
 P002   C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 P003   C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 P004   C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 P005   C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 P006   C-KS301   C-131-05381  E4     2000-00                                      20990   P002
 P007   C-KS301   C-131-05381  E4     2000-00                                      20989   P003
 P008   C-KS301   C-131-05381  E4     2000-00                                      20989   P004
 P009   C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 P010   C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 P011   C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 P012   C-KS301   C-131-05381  E4     2000-00                                      20989   P005
 P013   C-KS301   C-131-05412  E201   2000-00                                      20987   P006
 P014   C-KS301   C-131-05412  E201   2000-00                                      20987   P007
 P015   C-KS301   C-131-05412  E201   2000-00                                      20987   P008
 P016   C-KS301   C-131-05412  E201   2000-00                                      20988   P009
 P017   C-KS301   C-131-05381  E4     2000-00                                      21341   P010
 P018   C-KS301   C-131-05381  E4     2000-00                                      21341   P011
 P019   C-KS301   C-131-05381  E4     2000-00                                      21341   P012
 P020   C-KS301   C-131-05381  E4     2000-00                                      21341   P013
 P021   C-KS301   C-131-05412  E201   2000-00                                      21340   P014
 P022   C-KS301   C-131-05412  E201   2000-00                                      21340   P015
 P023   C-KS301   C-131-05382  E5     2009-00                                      21339   P016
 P024   C-KS301   C-131-05382  E5     2005-08                                      21339   P017/P018
 P025   C-KS301   C-131-05382  E5     2009-00                                      21339   P019
 P026   C-KS301   C-131-05382  E5     2005-08                                      21339   P020
 P027   C-KS301   C-131-05382  E5     2009-00                                      21339   P021
 P028   C-KS301   C-131-05382  E5     2005-08                                      21339   P022
 P029   C-KS301   C-131-05382  E5     2009-00                                      21339   P023
 P030   C-KS301   C-131-05382  E5     2005-08                                      21339   P024
 PA     C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 PB     C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 PC     C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 PD     C-KS301   C-131-05381  E4     2000-00                                      -----   N/A
 PE     C-KS301   C-131-05412  E201   2000-00                                      -----   N/A
 PF     C-KS301   C-131-05412  E201   2000-00                                      -----   N/A
                   ..... END REPORT .....
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.DATE 20 DEC 84 16:53:47 RID 6 11 DEC 84 BECHTEL

. AWS WELDING REPORT
. APPENDIX B. PAGE 1 of 10

BUILDING	BECHTEL ID	VENDOR ID
AUXILIARY	* C-121-00007	K6720-0-E801
AUXILIARY	C-121-00010	K6720-0-E001
AUXILIARY	C-121-00011	K6720-0-E003
AUXILIARY	* C-121-00034	K6720-0-E103
AUXILIARY	C-121-00037	K6720-0-E108
AUXILIARY	C-121-00110	K6720-0-E109
AUXILIARY	* C-121-00127	K6720-0-E111
AUXILIARY	* C-121-00128	K6720-0-E112
AUXILIARY	* C-121-00130	K6720-0-E203
AUXILIARY	* C-121-00165	K6720-0-E205
AUXILIARY	* C-121-00274	K6720-0-E403
AUXILIARY	C-121-00494	K6720-0-E1111
AUXILIARY	C-121-00495	K6720-0-E1121
AUXILIARY	C-121-00496	K6720-0-E1131
AUXILIARY	C-121-00497	K6720-0-E1141
AUXILIARY	C-121-00498	K6720-0-E1151
AUXILIARY	C-121-00549	K6720-0-E802
AUXILIARY	C-121-00581	K6710-0-E107
AUXILIARY	* C-121-00617	K6710-0-E206
AUXILIARY	C-121-00621	K6710-0-E209
AUXILIARY	* C-121-00627	K6710-0-E402
AUXILIARY	* C-121-00629	K6710-0-E502
AUXILIARY	C-121-00682	K6710-0-E405
AUXILIARY	C-121-00686	K6710-0-E503
AUXILIARY	C-121-00878	K6710-1-FW801
AUXILIARY	C-121-00880	K6720-0-E803
AUXILIARY	C-121-00881	K6720-0-E804
AUXILIARY	C-121-00883	K6720-0-E807
AUXILIARY	* C-121-00912	K6710-1-E401
AUXILIARY	C-121-00913	K6720-0-E701
AUXILIARY	C-121-00933	K6720-0-E703
AUXILIARY	* C-121-00934	K6720-0-E704
AUXILIARY	* C-121-00961	K6710-1-FW812
AUXILIARY	* C-121-00962	K6710-1-FW813
AUXILIARY	C-121-00963	K6710-1-FW814
AUXILIARY	C-121-00969	K6710-1-E101
AUXILIARY	C-121-00970	K6710-1-E102
AUXILIARY	* C-121-00971	K6710-1-E105
AUXILIARY	* C-121-00973	K6710-1-E201
AUXILIARY	* C-121-00976	K6710-1-E202
AUXILIARY	* C-121-00978	K6710-1-E208
AUXILIARY	* C-121-00980	K6710-1-E211
AUXILIARY	C-121-00982	K6710-1-E504
AUXILIARY	* C-121-01549	K6710-1-E302
AUXILIARY	* C-121-01561	K6710-1-FW815
AUXILIARY	C-121-01562	K6710-1-FW816
AUXILIARY	C-121-01563	K6710-1-FW817
AUXILIARY	C-121-01568	K6720-0-E808
AUXILIARY	C-121-01619	K6710-1-FW818

* Structurally significant joints identified on drawing with asterisk.

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*                .                   .                       . AWS WELDING REPORT
* BUILDING       .  BECHTEL ID       .     VENDOR ID         . APPENDIX B, PAGE 2
*==============.================.====================.============================
  AUXILIARY          C-121-01620     K6710-1-FW819
  AUXILIARY        * C-121-01621     K6710-1-FW820
  AUXILIARY        * C-121-01622     K6710-1-FW821
  AUXILIARY        * C-121-01634     K6710-1-E104
  AUXILIARY        * C-121-01635     K6710-1-E204
  AUXILIARY        * C-121-01636     K6710-1-E501
  AUXILIARY          C-121-01681     K6710-1-FW822
  AUXILIARY        * C-121-01683     K6720-0-E809
  AUXILIARY        * C-121-01685     K6710-1-E301
  AUXILIARY          C-121-01691     K6710-1-FW823
  AUXILIARY          C-121-01692     K6710-1-FW829
  AUXILIARY        * C-121-01700     K6710-1-E106
  AUXILIARY          C-121-01701     K6710-1-E802
  AUXILIARY        * C-121-01773     K6710-1-FW824
  AUXILIARY        * C-121-01776     K6710-1-FW825
  AUXILIARY          C-121-01779     K6710-1-FW826
  AUXILIARY        * C-121-01780     K6710-1-FW827
  AUXILIARY          C-121-01783     K6710-1-FW830
  AUXILIARY        * C-121-01786     K6710-1-E207
  AUXILIARY        * C-121-01789     K6710-1-E210
  AUXILIARY        * C-121-01790     K6720-0-E811
  AUXILIARY          C-121-01818     K6720-0-E812
  AUXILIARY          C-121-01824     K6710-1-E806
  AUXILIARY        * C-121-01871     K6710-1-E110
  AUXILIARY          C-121-01874     K6710-1-FW837
  AUXILIARY        * C-121-01883     K6710-1-FW838
  AUXILIARY        * C-121-01884     K6720X1-0-E601
  AUXILIARY        * C-121-01885     K6720X1-0-E602
  AUXILIARY        * C-121-01886     K6720X1-0-FW1
  AUXILIARY        * C-121-01887     K6720X1-0-FW2
  AUXILIARY        * C-121-01929     K6710-1-E404
  AUXILIARY          C-121-01939     K6720X1-0-FW3
  AUXILIARY          C-121-01940     K6720X1-0-FW4
  AUXILIARY        * C-121-01945     K6720-0-FW839
  AUXILIARY          C-121-01947     K6720-0-E004
  AUXILIARY        * C-121-01976     K6710-1-FW841
  AUXILIARY          C-121-01980     K6720X4-0-FW12
  AUXILIARY          C-121-10356     K6710-1-FW832
  AUXILIARY        * C-121-10639     K6710-1-FW833
  AUXILIARY          C-121-10645     K6710-1-FW831
  AUXILIARY        * C-121-10657     K6710-1-FW834
  AUXILIARY        * C-121-10675     K6710-1-E702
  AUXILIARY          C-121-10725     K6710-0-E002
  AUXILIARY          C-121-10728     K6710-1-FW835
  AUXILIARY        * C-121-10731     K6710-1-E705
  AUXILIARY          C-121-10739     K6710-1-FW836
  AUXILIARY          C-121-12007     K6720-0-FW840
  AUXILIARY          C-121-12010     K6720-0-FW101
  AUXILIARY          C-121-12019     K6720X2-0-FW1
  AUXILIARY        * C-121-12026     K6720X3-0-E706
  AUXILIARY        * C-121-12027     K6720X3-0-E707
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*               .                   .                      . AWS WELDING REPORT
* BUILDING      .  BECHTEL ID       .      VENDOR ID       . APPENDIX B. PAGE 3
*============ ==.=================.====================.============================
 AUXILIARY         C-121-12043    K6720X3-0-E708
 AUXILIARY         C-131-05412    M-412A-E201
 AUXILIARY         C-131-05413    M-412A-E202
 AUXILIARY         C-131-05482    M-312B-E104
 AUXILIARY         C-131-05579    M-312B-E106
 AUXILIARY         C-131-05725    M-312B-E109
 AUXILIARY         C-131-05780    M-E1
 AUXILIARY       * C-131-05794    5B-E1
 AUXILIARY       * C-131-05798    31-E2
 AUXILIARY       * C-131-05799    31-E3
                          ..... END REPORT .....
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.DATE 20 DEC 84  16:53:47  RID      6    11 DEC 84  BECHTEL
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*               .               .                    . AWS WELDING REPORT
* BUILDING     .  BECHTEL ID    .     VENDOR ID      . APPENDIX B. PAGE 4
*============.==============.=================.=========================
 REACTOR       * C-0X2901
 REACTOR       * C-0X2902
 REACTOR         C-0X2903
 REACTOR       * C-0X2904
 REACTOR       * C-0X2905
 REACTOR         C-0X2906
 REACTOR         C-0X2907
 REACTOR         C-0X2908
 REACTOR         C-0X2909
 REACTOR         C-0X2910
 REACTOR         C-0X2911
 REACTOR       * C-0X2912
 REACTOR         C-0X2913
 REACTOR       * C-0X2914
 REACTOR         C-0X2915
 REACTOR         C-0X2916
 REACTOR       * C-0X2917
 REACTOR         C-0X2918
 REACTOR         C-0X2919
 REACTOR         C-0X2920
 REACTOR         C-0X2921
 REACTOR         C-0X2922
 REACTOR         C-0X2923
 REACTOR         C-0X2924
 REACTOR       * C-1X2925
 REACTOR         C-1X2950
 REACTOR         C-0X8902
 REACTOR         C-0X8903
 REACTOR         C-0X8904
 REACTOR         C-0X8905
 REACTOR         C-0X8906
 REACTOR         C-0X8907
 REACTOR         C-121-08081   K6724-0-E115
 REACTOR         C-121-08082   K6724-0-E112
 REACTOR         C-121-08083   K6724-0-E113
 REACTOR         C-121-08122   K6724-0-E116
 REACTOR         C-121-08302   K6724-0-E119
 REACTOR       * C-121-08355   K6724-0-E122
 REACTOR       * C-121-08360   K6724-0-E117
 REACTOR       * C-121-08361   K6724-0-E121
 REACTOR       * C-121-08362   K6724-0-E123
 REACTOR       * C-121-08367   K6724-0-E120
 REACTOR         C-121-08379   K6724-0-E105A
 REACTOR       * C-121-08504   K6714-0-E101
 REACTOR       * C-121-08506   K6714-0-E102
 REACTOR       * C-121-08510   K6714-0-E104
 REACTOR       * C-121-08523   K6714-0-E111
 REACTOR       * C-121-08543   K6724-0-E124
 REACTOR       * C-121-08549   K6724-0-E601
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* BUILDING	BECHTEL ID	VENDOR ID
REACTOR	C-121-08562	K6724-0-E106A
REACTOR	C-121-08572	K6714-0-E114
REACTOR	* C-121-08576	K6714-0-E108
REACTOR	* C-121-08577	K6714-0-E106
REACTOR	C-121-08621	K6714-0-E118
REACTOR	* C-121-08625	K6714-0-E110
REACTOR	C-121-08741	K6714-1-FW602
REACTOR	* C-121-08752	K6724-0-E602
REACTOR	* C-121-08753	K6724-0-E603
REACTOR	* C-121-08772	K6724-0-E608
REACTOR	* C-121-08773	K6724-0-E609
REACTOR	* C-121-08786	K6724-0-E604
REACTOR	* C-121-08787	K6724-0-E605
REACTOR	C-121-08815	K6724X2-0-FW401
REACTOR	* C-121-08846	K6724-0-E606
REACTOR	C-121-08847	K6724-0-E607
REACTOR	C-121-08896	K6714-1-FW200
REACTOR	C-121-08897	K6714-1-FW204
REACTOR	* C-121-08909	K6714-1-E105
REACTOR	* C-121-08912	K6714-1-E107
REACTOR	* C-121-08950	K6724-0-E501
REACTOR	* C-121-08982	K6724X5-0-E610
REACTOR	C-121-08997	K6724X2-0-FW2
REACTOR	* C-121-08999	K6724X2-0-FW1
REACTOR	* C-121-13001	K6714-1-E103
REACTOR	* C-121-13017	K6724-0-FW205
REACTOR	C-121-13052	K6724X6-0-E126
REACTOR	C-121-13060	K6724X6-0-FW1
REACTOR	* C-121-13069	K6724X2-0-E125
REACTOR	C-121-13070	K6724X2-0-FW3
REACTOR	* C-121-13093	K6714-1-E109
REACTOR	* C-121-13098	K6724X7-0-FW301
REACTOR	* C-121-13099	K6724X7-0-FW302
REACTOR	C-121-13119	K6724X7-0-FW303
REACTOR	C-121-13120	K6724X7-0-FW101
REACTOR	C-121-13241	K6724X9-0-FW11
REACTOR	C-121-13242	K6724X9-0-E611
REACTOR	* C-121-13258	K6724X11-0-FW14
REACTOR	C-121-13259	K6724X11-0-FW15
REACTOR	* C-121-13265	K6724X11-0-FW13
REACTOR	C-121-19096	K6724X10-0-FW12
REACTOR	C-131-05649	M-36-E1
REACTOR	C-131-05650	M-36-E2
REACTOR	C-131-05651	M-36-E3
REACTOR	C-131-05652	M-36-E4
REACTOR	* C-131-05666	E1
REACTOR	C-131-05671	E2
REACTOR	C-131-05672	E3
REACTOR	C-131-05712	M-36-E5
REACTOR	C-131-05732	M-24-E1
REACTOR	* C-131-05734	M-36-E6

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*                 .                    .                            . AWS WELDING REPORT
* BUILDING        .  BECHTEL ID        .      VENDOR ID             . APPENDIX B. PAGE 6
*=============.===============.==================.==========================
 REACTOR          * C-131-05743    E12
 REACTOR          * C-131-05759    E13
 REACTOR          * C-131-05800    31-E4
 REACTOR            C-131-05809    M-19-E2
                          ..... END REPORT .....
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.DATE 20 DEC 84  16:53:47  RID      6    11 DEC 84  BECHTEL
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*            .                  .                      . AWS WELDING REPORT
* BUILDING   .   BECHTEL ID     .     VENDOR ID        . APPENDIX B, PAGE 7
*============.==================.======================.========================
  CONTROL          C-121-01053    K6721-0-E10
  CONTROL          C-121-01272    K6721-0-E11
  CONTROL          C-121-01311    K6711-1-FW24
  CONTROL          C-121-01312    K6711-1-FW25
  CONTROL          C-121-01313    K6711-1-FW26
  CONTROL          C-121-01314    K6711-1-FW27
  CONTROL          C-121-01315    K6711-1-FW28
  CONTROL          C-121-01316    K6711-1-FW44
  CONTROL          C-121-01317    K6711-1-FW45
  CONTROL          C-121-01318    K6711-1-FW46
  CONTROL          C-121-01319    K6711-1-FW47
  CONTROL          C-121-01320    K6711-1-FW49
  CONTROL          C-121-01321    K6711-1-FW52
  CONTROL          C-121-01322    K6711-1-FW53
  CONTROL          C-121-01323    K6711-1-FW54
  CONTROL          C-121-01324    K6711-1-FW55
  CONTROL          C-121-01325    K6711-1-FW56
  CONTROL          C-121-01326    K6711-1-FW57
  CONTROL          C-121-01327    K6711-1-FW58
  CONTROL          C-121-01328    K6711-1-FW59
  CONTROL          C-121-01329    K6711-1-FW60
  CONTROL          C-121-01330    K6711-1-FW62
  CONTROL          C-121-01331    K6711-1-FW63
  CONTROL          C-121-01332    K6711-1-FW65
  CONTROL          C-121-01333    K6711-1-FW66
  CONTROL          C-121-01334    K6711-1-FW77
  CONTROL        * C-121-01408    K6711-1-E2
  CONTROL        * C-121-01411    K6711-1-E3
  CONTROL        * C-121-01414    K6711-1-E4
  CONTROL        * C-121-01417    K6711-1-E5
  CONTROL        * C-121-01420    K6711-1-E6
  CONTROL        * C-121-01426    K6711-1-E1
  CONTROL          C-121-01428    K6711-1-FW17
  CONTROL          C-121-01430    K6711-1-FW19
  CONTROL          C-121-01434    K6711-1-E9
  CONTROL        * C-121-01484    K6711X1-1-E12
  CONTROL        * C-121-01485    K6711X1-1-E13
  CONTROL        * C-121-09015    K6711-1-E7
  CONTROL          C-121-09023    K6711-1-E8
  CONTROL        * C-131-05505    4B-E7
  CONTROL          C-131-05684    M-12B-E107
                 ..... END REPORT .....
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.DATE 20 DEC 84  16:53:47  RID      6    11 DEC 84  BECHTEL
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*              .                .                  . AWS WELDING REPORT
* BUILDING     .  BECHTEL ID    .     VENDOR ID    . APPENDIX B. PAGE 8
*============.================.==================.==========================
 DIESEL GEN.     C-121-08387   K6726-0-E1
 DIESEL GEN.     C-121-08391   K6726-0-E5
 DIESEL GEN.   * C-121-08831   K6716-1-E3
 DIESEL GEN.   * C-121-08840   K6726X2-0-E8
 DIESEL GEN.   * C-121-08861   K6716X3-0-E9
 DIESEL GEN.   * C-121-08899   K6726X1-0-E6
 DIESEL GEN.   * C-121-08900   K6726X1-0-E7
 DIESEL GEN.   * C-121-08958   K6716-1-E2
 DIESEL GEN.     C-121-08959   K6716-1-FW1
 DIESEL GEN.   * C-121-13249   K6716-1-E4
                    ..... END REPORT .....
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.DATE 20 DEC 84  16:53:47  R1D      6    11 DEC 84  BECHTEL
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*             .                 .                   . AWS WELDING REPORT
* BUILDING    .  BECHTEL ID     .     VENDOR ID     . APPENDIX B. PAGE 9
*=============.=================.===================.===========================
 FUEL         * C-121-05765    E4
 FUEL         * C-121-05813    E14
 FUEL           C-121-05821    M-19-E3
 FUEL           C-121-19028    K6728-0-E4
 FUEL         * C-121-19029    K6728-0-E5
 FUEL         * C-121-19030    K6728-0-E6
 FUEL           C-121-19032    K6728-0-E8
 FUEL           C-121-19066    K6728X2-0-E10
 FUEL         * C-121-19078    K6728X4-0-E10
 FUEL           C-131-19000    K6728-0-E1
 FUEL         * C-131-19001    K6728-0-E2
 FUEL         * C-131-19027    K6728-0-E3
 FUEL         * C-131-19069    K6718-1-E7
                      ..... END REPORT .....
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AWS WELDING REPORT
APPENDIX C. PAGE 1 of 8

FIELD FABRICATION REQUEST		
BUILDING	NUMBER	DATE
REACTOR	RB0046	11-26-79
AUXILIARY	0556	11-03-82
REACTOR	RB0135	01-24-80
AUXILIARY	0030	02-14-79
AUXILIARY	0504	08-04-82
AUXILIARY	0503	08-04-82
AUXILIARY	0506	08-04-82
REACTOR	RB0006	09-18-79
REACTOR	RB1037	08-03-83
	0420	11-11-81
FUEL	F0073	01-18-82
REACTOR	RB0437	02-23-81
REACTOR	RB0671	04-27-82
REACTOR	RB0464	04-07-81
REACTOR	RB1019	07-13-83
FUEL	F0114	03-20-84
FUEL	F0091	11-10-82
REACTOR	RB0919	03-14-83
REACTOR	RB0717	07-13-82
REACTOR	RB1779	10-12-84
REACTOR		04-22-78
REACTOR	RB0842	11-18-82
REACTOR	RB0153	02-07-80
REACTOR	RB1351	02-06-84
REACTOR	RB0437	02-23-81
REACTOR	RB0360	11-18-80
REACTOR	RB0065	12-20-79
REACTOR	RB0135	01-24-80
ESWS	0012	02-25-82
DIESEL	D0012	02-26-79
	0010	06-03-80
FUEL	F0014	08-19-80
REACTOR	RB0065	12-20-79
REACTOR	RB0391	12-23-80
REACTOR	RB0623	02-24-82
REACTOR	RB0376	12-08-80
REACTOR	RB0360	11-18-80
AUXILIARY		08-10-78
AUXILIARY	N/A	08-15-78
AUXILIARY	0028	12-13-78
RADWASTE	RW0037	02-24-81
FUEL	F0020	10-27-80
FUEL	F0050	03-04-81
AUXILIARY	0697	10-03-83
AUXILIARY	0823	05-19-84
	0791	04-28-84
AUXILIARY	0901	08-24-84
ESWS	0029	09-17-84
DIESEL	0798	05-01-84

FIELD FABRICATION REQUEST

BUILDING	NUMBER	DATE
ESWS	0031	09-23-84
ESWS	0028	09-17-84
ESWS	0030	09-17-84
REACTOR	RB0431	02-16-84
AUXILIARY	0451	02-15-82
AUXILIARY	0452	02-23-82
REACTOR	RB1133	11-22-83
CONTROL	0899	08-21-84
REACTOR	RB1112	11-14-83
REACTOR	RB1073	09-13-83
REACTOR	RB0928	03-31-83
REACTOR	RB0925	04-28-83
REACTOR	RB0853	01-25-83
REACTOR	RB0853	03-01-83
AUXILIARY	0646	05-26-83
FUEL	F0099	05-09-83
REACTOR	RB0970	05-04-83
REACTOR	RB0965	04-28-83
REACTOR	RB0952	04-18-83
REACTOR	RB0951	04-18-83
REACTOR	RB0941	04-13-83
REACTOR	RB0937	04-11-83
AUXILIARY	0630	03-30-83
REACTOR	RB0906	03-07-83
REACTOR	RB0900	02-28-83
REACTOR	RB0888	02-10-83
REACTOR	RB0894	02-16-83
AUXILIARY	0645	05-24-83
REACTOR	RB0982	05-17-83
REACTOR	RB0978	05-12-83
TURBINE	0491	06-03-82
AUXILIARY	0493	06-16-82
CONTROL	0493	06-16-82
REACTOR	RB0695	06-07-82
REACTOR	RB0716	07-09-82
RADWASTE	RW0042	07-15-82
REACTOR	RB0723	07-19-82
REACTOR	RB0721	07-19-82
REACTOR	RB0725	07-21-82
REACTOR	RB0729	07-29-82
AUXILIARY	0500	08-02-82
FUEL	F0109	11-14-83
AUXILIARY	0700	10-10-83
REACTOR	RB1086	09-28-83
AUXILIARY	0703	10-17-83
REACTOR	RB1058	08-25-83
REACTOR	RB0875	01-26-83
REACTOR	RB1061	08-29-83
REACTOR	RB1036	08-03-83
REACTOR	RB1034	08-03-83
AUXILIARY	0670	07-29-83

FIELD FABRICATION REQUEST BUILDING	NUMBER	DATE
	0487	05-13-82
AUXILIARY	0437	01-20-82
AUXILIARY	0436	01-20-82
REACTOR	RB0606	01-27-82
REACTOR	RB0617	02-10-82
AUXILIARY	0471	04-14-82
AUXILIARY	0472	04-14-82
REACTOR	RB0654	04-12-82
REACTOR	RB0646	08-30-82
REACTOR	RB0637	03-23-82
REACTOR	RB0639	03-23-82
REACTOR	RB0638	03-23-82
AUXILIARY	0458	02-25-82
AUXILIARY	0457	02-24-82
REACTOR	RB0620	02-17-82
FUEL	R0081	04-22-82
REACTOR	RB0676	05-04-82
RADWASTE	RW0003	03-27-79
REACTOR	R0005	10-24-78
REACTOR	R0001	09-07-78
REACTOR	R0002	09-07-78
REACTOR	RB0601	01-18-82
REACTOR	RB0602	01-19-83
AUXILIARY	0046	05-14-79
REACTOR	RB0618	02-16-82
REACTOR	RB0619	02-17-82
FUEL	F0076	03-04-82
REACTOR	RB0628	03-01-82
REACTOR	RB0616	02-10-82
FUEL	F0069	10-19-81
	0409	09-28-81
REACTOR	RB0498	06-16-81
REACTOR	RB0482	05-21-81
REACTOR	RB0466	05-04-81
RADWASTE	RW0038	04-01-81
REACTOR	RB0446	03-10-81
REACTOR	RB0446	03-03-81
REACTOR	RB0427	02-10-81
FUEL	F0045	02-09-81
REACTOR	RB0377	12-09-80
REACTOR	RB0366	11-24-80
REACTOR	RB0367	11-24-80
REACTOR	RB0335	10-27-80
REACTOR	RB0337	10-29-80
AUXILIARY	0119	12-26-79
REACTOR	RB0371	12-02-80
REACTOR	RB0370	12-02-80
REACTOR	RB0373	12-03-80
REACTOR	RB0022	10-16-79
REACTOR	RB0020	10-10-79
REACTOR	RB0573	11-04-81

FIELD FABRICATION REQUEST BUILDING	NUMBER	DATE
REACTPR	RB0562	10-26-81
REACTOR	RB0798	09-30-82
REACTOR	RB0792	10-04-82
REACTOR	RB0795	10-05-82
CONTROL	0550	10-14-82
REACTOR	RB0803	10-15-82
REACTOR	RB0789	09-23-82
	0536	09-21-82
AUXILIARY	0513	09-08-82
	0022	08-23-82
REACTOR	RB0745	08-11-82
FUEL	F0090	11-02-82
REACTOR	R0003	10-03-78
REACTOR	RB1414	04-17-84
AUXILIARY	0665	07-12-83
AUXILIARY	0667	07-18-83
ESWS	0004	01-20-82
CORRIDOR	0673	08-09-83
AUXILIARY	0442	02-02-82
REACTOR	RB0509	06-29-81
AUXILIARY	0384	05-12-81
FUEL	F0043	02-02-81
FUEL	F0042	01-29-81
CONTROL	0320	01-29-81
CONTROL	0289	10-22-80
CONTROL	0288	10-21-80
	0280	10-13-80
CONTROL	0260	09-16-80
AUXILIARY	0257	09-10-80
REACTOR	RB0318	09-10-80
FUEL	F0016	09-03-80
CONTROL	0239	08-05-80
	0139	02-07-80
AUXILIARY	0122	01-09-80
	0097	10-25-79
DIESEL	0094	10-10-79
AUXILIARY	0066	08-04-79
AUXILIARY	0053	06-25-79
	0051	06-11-79
	0025	12-04-78
	0012	09-14-78
AUXILIARY	A0082	06-29-82
CONTROL	C0056	07-12-83
REACTOR	RB0822	04-25-83
REACTOR	RB0822	03-23-83
REACTOR	RB0929	03-31-83
REACTOR	RB0821	01-31-83
REACTOR	RB0853	02-03-83
REACTOR	RB0924	03-17-83
REACTOR	RB0821	01-31-83
REACTOR	RB0924	09-07-83

FIELD FABRICATION REQUEST

BUILDING	NUMBER	DATE
REACTOR	RB0924	09-06-83
AUXILIARY	A0153	08-11-83
REACTOR	RB1133	11-22-83
REACTOR	RB0742	08-11-82
	B0018	06-28-82
	0450	02-15-82
	0013	10-05-78
DIESEL	D0322	08-06-79
FUEL	F0068	10-01-81
REACTOR	RB0822	11-18-82
REACTOR	RB0822	12-02-82
REACTOR	1374	04-11-84
REACTOR	RB0244	05-05-80
REACTOR	RB0853	01-13-83
REACTOR	RB1619	06-01-84
AUXILIARY	A0169	06-25-84
DIESEL	0155	03-03-80
DIESEL	0144	02-19-80
FUEL	F0093	11-29-82
REACTOR	RB0089	01-03-80
FUEL	F0019	10-20-80
FUEL	F0015	09-02-80
FUEL	F0013	08-05-80
FUEL	F0010	07-23-80
SITE	RVH0002	12-21-81
REACTOR	RB0271	06-10-80
REACTOR	RB0272	06-10-80
REACTOR	RB0923	03-17-83
AUXILIARY	0555	11-03-82
AUXILIARY	0557	11-04-82
AUXILIARY	0559	11-08-82
AUXILIARY	0560	11-11-82
AUXILIARY	0565	12-02-82
REACTOR	RB0583	12-01-81
AUXILIARY	0584	01-10-83
AUXILIARY	0585	01-10-83
AUXILIARY	0593	01-17-83
AUXILIARY	0744	01-30-84
REACTOR	RB0857	12-21-82
REACTOR	RB1312	03-22-84
REACTOR	RB1652	06-08-84
REACTOR	RB1671	06-12-84
REACTOR	RB1726	06-23-84
REACTOR	RB1739	07-07-84
REACTOR	RB0209	04-03-80
REACTOR	RB0191	03-24-80
REACTOR	RB0178	03-13-80
REACTOR	RB1259	02-15-84
RADWASTE	RW0044	05-10-84
ESWS	0032	10-02-84
REACTOR	RB0227	04-22-80

```
 *
 *       FIELD FABRICATION REQUEST                         AWS WELDING REPORT
 *    BUILDING      .  NUMBER  .  DATE    .                APPENDIX C. PAGE 6
*================.==========.========.========================================
   REACTOR             RB0510  06-30-81
   AUXILIARY             0104  11-29-79
                         0079  08-22-79
                         0078  08-22-79
                         0069  08-09-79
                         0170  03-24-80
   AUXILIARY
                         0010  08-15-78
                         0011  08-15-78





                        ..... END REPORT .....
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LIST OF NONCONFORMANCE REPORTS

1-041-C
1-042-C
1-043-C
1-045-C
1-047-C
1-048-C
1-049-C
1-074-C
1-082-C
1-083-C
1-084-C
1-085-C
1-086-C
1-087-C
1-090-C
1-094-C
1-095-C
1-096-C
1-0104-C
1-0123-C
1-0124-C
1-0128-C
1-0136-C
1-0139-C
1-0143-C
1-0148-C
1-0149-C
1-0158-C
1-0160-C
1-0166-C
1-0170-C
1-0178-C
1-0183-C
1-0189-C
1-0205-C
1-0238-C
1-0244-C
1-0255-C
1-0266-C
1-0276-C
1-0277-C
1-0335-C
1-0338-C
1-0339-C
1-0340-C
1-0345-C
1-0355-C
1-0385-C
1-0423-C
1-0433-C
1-0434-C
1-0439-C
1-0445-C
1-0446-C
1-0503-C
1-0549-C
1-0550-C
1-0551-C
1-0552-C
1SN0738C
1SN0899C
1SN0972C
1SN0992C
1SN1056C
1SN1057C
1SN1277CW
1SN1283C
1SN1432M
1SN1486C
1SN1549C
1SN1567C
1SN1568C
1SN1649C
1SN1906C
1SN2061C
1SN2138C
1SN2154C
1SN2228C
1SN2419CW
1SN2489C
1NN2530C
1SN2585C
1SN2642C
1SN2647M
1SN2658C
1SN2698C
1SN2728C
1SN2793C
1SN2945C
1NN2972C
1SN2987C
1SN2992C
1SN3013C
1SN3017C
1SN3039C
1SN3041C
1SN3111C
1SN3115C
1NN3132C
1SN3139C
1SN320CW
1SN3255C
1SN3261C
1SN3385C
1SN3386C
1SN3475C
1SN3482C
1SN3483C
1SN3516CW
1SN3589C
1SN3614C
1SN3753C
1NN3768C
1SN3779C
1SN3784C
1SN3794C
1SN3795C
1SN3796C
1SN3890C
1SN3891C
1SN3892C
1NN4121C
1SN4276C
1SN4283C
1SN4293C
1SN4389C
1NN4530C
1SN4536C
1SN5823C
1SN5847C
1NN6009C
1SN6117C
1SN6299C
1SN6331C
1SN6795C
1SN6809C
1SN8312C
1SN8378C
1SN8590C
1SN8612C
1SN8890C
1NN8967C
1SN9119C
1SN947[illegible]
1SN10026C
1SN10381PW
1SN10931C
1SN11086C
1SN11282C
1SN11592C
1SN11689C
1SN11986C
1SN12190C
1SN12517C
1SN13280C
1SN15220MW
1SN15352C
1SN15685PW
1SN15723CW
1SN16728CW
1SN16988CW
1SN19864C

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE 12
*JOINT.TYPE       U S      .                   W D                         .      I C      . U R . U C .   M M     . I J    GM
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
*=====.====.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.
*
 A211  F                                                                                          4
*
 A212  F                                                                                                                        OK
*
 A213  F                            * 2                                                           1
*WD-C:DEFECT LENGTH IS 1/2  MAXIMUM
*
 A214  F                    * 1
*WD-A:DEFECT LENGTH IS 1/2
*
 A215  F                                                                                          4
*
 A216  F          2                                                                 R 2
*
 A217  F          1                                                                               3
*
 A218  F          2                                                                 R 2                   1
*
 A219  F          2   1                                                                                   1
*
 A220  F                            * 1                                                           4
*WD-C:DEFECT LENGTH IS 1/8
*
 A221  F                                                                            R 2
*
 A222  F                    * 1                                                     R 2           1
*WD-A:DEFECT LENGTH IS 3/8
*
 A223  F                            * 2
*WD-C:DEFECT LENGTH IS 5/16  MAXIMUM
*
 A224  F                                                                            R 2
*
 A225  F          1                                                                 R 2
*
 A226  F                            * 1
*WD-C:DEFECT LENGTH IS 1
*
 A227  F            * 1                                                             R 2
*US-C:UNABLE TO MEASURE ACCURATELY DUE TO GRINDING-SIZE VISUALLY REJECTED
*
 A228  F                    * 1                                                     R 2
*WD-A:DEFECT LENGTH IS 1/2
*
 A229  F            R 2     * 1                                                     R 2
*WD-A:DEFECT LENGTH IS 2-3/8
*
 A230  F                    * 1
*WD-A:DEFECT LENGTH IS 1/4
*
```

```
.   AUXILIARY BUILDING                                              F004532
*      .            .                                                    .      AWS WELDING REPORT, APPENDIX D, PAGE //
*JOINT.TYPE    U S      .              W D                               .    I C        . U R . U C .    M A    . I J   GN
*      .     A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
*======.====.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.
 A187  F                                                                                                                   OK
*
 A188  F                                                                                                                   OK
*
 A189  F                                                                                                                   OK
*
 A190  F                                                                                                                   OK
*
 A191  F         2                                                         R 2             2
*
 A192  F                                                                                                                   OK
*
 A193  F                                                                                                                   OK
*
 A194  F                                                                                                                   OK
*
 A195  F                                                                                                                   OK
*
 A196  F             6       1                                                                                         2   *
*GN:EXTENSIVE BASE MATERIAL DAMAGE (GOUGES) EXISTS ON EMBEDDED PLATE ADJACENT TO WELD NO. 7
*
 A197  F                                                                                                                   OK
*
 A198  F                     1
*
 A199  F                                                                                       1                           *
*GN:JOINT IS HEAVILY OXIDIZED
*
 A200  F                     2
*
 A201  F                                                                                                                   OK
*
 A202  F                                                                                                                   OK
*
 A203  F                   * 2
*WD-A:DEFECT LENGTH IS 1/2
*
 A204  F                                                                                                                   OK
*
 A205  F                                                                                                                   OK
*
 A206  F                                                                                                                   OK
*
 A207  F                   * 1
*WD-A:DEFECT LENGTH IS 3/8
*
 A208  F                                                                               1
*
 A209  F                                                                                                                   OK
*
 A210  F                                                                                                                   OK
```

```
.DATE 27 DEC 84  08:19:15  RID       2    13 NOV 84  BECHTEL
.   AUXILIARY BUILDING                                    F004532
*     .                    .                                               .        AWB WELDING REPORT, APPENDIX D, PAGE 2
*JOINT.TYPE       U S      .                   W D                         .      I C      .  U R  .  U C  .    M M    .  I J   GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
******.****.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.
 AA    F                                                                            R 4
*
 AB    F        R 1         * 1                                                     R 4           1
*WD-A:DEFECT LENGTH IS 3/8
*
 AC    F                                                                            R 4       4
*
 AD    F                                                                            R 4
*
 AE    F                                                                            R 4
*
 AF    F                                                                                                                    * 3
*MM-C:NO WELDS PRESENT ON WEST CLIP ANGLE TO BEAM
*
 A001  F      1   1   9                                                             R 4                                       2
*
 A002  F                                                                                                                          *
*GN:PREVIOUSLY INSPECTED AS JOINT AB
*
 A003  F        R 2           2               6                       2             R 4
*
 A004  F      1       1                                                               5           1
*
 A005  F          6   1     R 1     R 1       9                                     R 4           2
*
 A006  F              3       2       2       5                                       5               1                       1
*
 A007  F          2   7       3       3       7                         * 2           5               2                       5
*WD-L:PROFILE DEFECT NOTED.BUT NOT DEFINED
*
 A008  F                                                                              5           2                         R 2
*
 A009  F          3   1                                                               5       1                               1
*
 A010  F    * 1 R 2   2             R 1     R 4                                     R 4           1
*US-A:ONE LEG IS UNDERSIZED FOR 25% OF THE TOTAL LENGTH
*
 A011  F          3   2               2                                             R 4           1       1                   6
*
 A012  F    * 1   2   1               1                                               5                               1       1
*US-A:ONE LEG IS UNDERSIZED FOR APPROXIMATELY 50% OF THE TOTAL LENGTH
*
 A013  F        R 1   1                                                               6                               1
*
 A014  F          3                                                                 R 4
*
 A015  F          4   4                                                               6
*
 A016  F          2                                                                 R 4
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE 3
*JOINT.TYPE       U S      .                   W D                         .      I C      .  U R  .  U C  .    M M    .  I J   GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
******.****.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.
*
 A017  F                                    R 2                                     R 4
*
 A018  F        R 1                         R 4                                     R 4
*
 A019  F                                    R 3                                     R 4
*
 A020  F                                    R 1                                     R 4
*
 A021  F                                    R 4                                     R 4
*
 A022  F                                                                * 1           7           1
*WD-L:EXCESSIVE CONCAVITY/INSUFFICIENT THROAT
*
 A023  F          4   1                                                               6       1                       1
*
 A024  F          3                       2                                           8       4         R 1
*
 A025  F          1   1                                                               5           3
*
 A026  F                  2                                                           3                                      10
*
 A027  F        R 1                         R 4                                     R 4
*
 A028  F                                                                                                                * X
*IJ-A:EMBEDDED IN CONCRETE
*
 A029  F          1   3                                                               6       1   1
*
 A030  F    * 1   3   2                       1                                       5       2   1
*US-A:ONE LEG IS UNDERSIZED FOR APPROXIMATELY 13% OF THE TOTAL LENGTH
*
 A031  F        R 3   4                                                               6           3
*
 A032  F          3   3                                                               5
*
 A033  F    * 1   3 R 1                       5                                       6           2
*US-A:ONE LEG IS UNDERSIZED FOR APPROXIMATELY 13% OF THE TOTAL LENGTH
*
 A034  F          2   3                       4                                       6           2
*
 A035  F              3             * 1       6                                       6           1                         * 2
*WD-C:DEFECT LENGTH IS 1/16  ; IJ-B:LOCATED IN BLOCKWALL
*
 A036  F      2     * 4                       1                                     R 4                             * 2
*MM-C:SEAT TO BEAM WELDS ARE MISSING ; US-C:ONE WELD WAS REJECTED BASED ON VISUAL INSPECTION
*
 A037  F
*GN:PREVIOUSLY INSPECTED AS JOINT AE
*
 A038  F          1                           6                                       6           2
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE 4
*JOINT.TYPE       U S      .                   W D                         .      I C      . U R .   U C   .    M M    .  I J  GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
*=====.====.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.
*
 A039  F          2   1       1               3                                       6                             * 2
*MM-C:SEAT TO BEAM WELDS ARE MISSING
*
 A040  F              2                       2                                       6                             * 2
*MM-C:SEAT TO BEAM WELDS ARE MISSING
*
 A041  F          1         R 1               5                                       5                             * 2     * 1
*MM-C:SEAT TO BEAM WELDS ARE MISSING ; IJ-B:WELD IN PLACE, BUT MEASUREMENT NOT OBTAINABLE
*
 A042  F    *R1   3   3                                                               6           1         * 1
*US-A:ONE LEG IS UNDERSIZED FOR APPROXIMATELY 19% OF THE TOTAL LENGTH:MM-A:FILLER PLATE WAS INSTALLED
*
 A043  F          1                         R 3                                       6           1         * 1
*MM-A:FILLER PLATE WAS INSTALLED
*
 A044  F                            *R1     R 4                                     R 4
*WD-C:DEFECT LENGTH IS 1/4
*
 A045  F                                      5                                     R 4                   1
*
 A046  F    * 1   1   1                                                               6                             * 2
*US-A:ONE LEG IS UNDERSIZED FOR PART OF THE LENGTH ; MM-C:SEAT TO BEAM WELDS ARE MISSING
*
 A047  F        R 3   3       3     * 1       7                     R 1               5       1   1
*WD-C:DEFECT LENGTH IS 3/8
*
 A048  F          2 R 1     R 1     * 1       3                                     R 4
*WD-C:DEFECT LENGTH IS 5/8
*
 A049  F          2   2                                                               6       2
*
 A050  F          3   3                       4                                       5
*
 A051  F          2   5     * 1     * 1     R 4                                     R 4           1       2
*WD-C:DEFECT LENGTH IS APPROX. 1/4   ; WD-A:DEFECT LENGTTH IS APPROX. 4-3/8
*
 A052  F          1       2                                                           7               2
*
 A053  F                                                                              7           1
*
 A054  F          1       2                                                           6           2   2
*
 A055  F                                    R 2                                     R 4                         * X
*MM-B:BEAM SEAT IS NOT INSTALLED
*
 A056  F                                      5     * 1                             R 4           1
*WD-G:GOUGES (1/8  DEEP) ACROSS WELD BEAD
*
 A057  F        R 1                 * 1       4                                     R 4
*WD-C:DEFECT LENGTH IS 1/4
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE 5
*JOINT.TYPE       U S      .                   W D                         .      I C      .  U R  .  U C  .       M M .  I J   GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
******.****.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.
*
 A058  F              1       2               2                                       3                             * 1     * 9
*MM-C:SEAT TO BEAM WELD IS MISSING  ; IJ-B:EMBEDDED IN CONCRETE
*
 A58A  F                      1                                                     R 4
*
 A059  F                                                                            R 4
*
 A060  F          2   1             * 1       6                                     R 4                             * 1     * 2
*WD-C:DEFECT LENGTH IS 1/2   ; MM-C:SEAT TO BEAM WELD IS MISSING  ; IJ-B:IN BLOCKWALL
*
 A061  F          2   2       2              11                       2               6               2             * 2
*MM-C:SEAT TO BEAM WELDS ARE MISSING
*
 A062  F                                                                                                                         OK
*
 A063  F    * 1   3   1                       8                                       6                             * 2     * 2
*MM-C:SEAT TO BEAM WELDS ARE MISSING  ; US-A:ONE LEG IS UNDERSIZED FOR APPROXIMATELY 16% OF THE TOTAL LENGTH
*IJ-B:LIMITED ACCESS-COULDN'T MEASURE ACCURATELY,BUT APPEARED TO MEET MINIMUM REQUIREMENTS
*
 A064  F                      1     * 1       7                                       6                   2         * 2     * 4
*MM-C:SEAT TO BEAM WELDS ARE MISSING  ; WD-C:DEFECT LENGTH IS 1/4
*IJ-B:LIMITED ACCESS-APPEAR TO MEET MINIMUM REQUIREMENTS
*
 A065  F        R 1   1             * 2       9 * 1                                   6       1       2   1                 * 2
*WD-C:DEFECT LENGTH IS 1/4  MAXIMUM  ; WD-F:DEFECT LENGTH IS 3/4  ; IJ-B:LIMITED ACCESS-VISUALLY OK
*
 A066  F                                                                                                                * X
*IJ-A:EMBEDDED IN CONCRETE
*
 A067  F    * 1   3         R 1               7                                       5               1             * 2     * 1
*MM-C:SEAT TO BEAM WELDS ARE MISSING  ; US-A:ONE LEG IS UNDERSIZED FOR APPROXIMATELY 19% OF THE TOTAL LENGTH
*IJ-B:CANNOT BE MEASURED DUE TO EDGE CONSUMPTION, BUT APPEARS OK
*
 A068  F          1                 * 1      11     * 8                     * 1       6                   2         * 2     * 6
*WD-C:DEFECT LENGTH IS 1/2  ; IC-A:1/2  DIAMETER BOLT HOLE IN WELD PATH ; MM-C:SEAT TO BEAM WELDS ARE MISSING
*WD-G:GOUGES DUE TO CONCRETE REMOVAL DEEPER THAN 1/8  (3 PLACES) $ GRINDING (5 PLACES)
*IJ-B:CANNOT BE MEASURED DUE TO EDGE CONSUMPTION AND/OR GRINDING-SIZE IS VISUALLY OK
*
 A069  F              2       2     * 1      12     * 2                     * 1       6                   1         * 2     * 9
*MM-C:SEAT TO BEAM WELDS ARE MISSING ; IC-A:1/2  DIAMETER BOLT HOLE IN WELD PATH
*WD-G:GOUGES DUE TO GRINDING  ; WD-C:BETWEEN WELD PASSES,FULL LENGTH
*IJ-B:INACCESSIBLE FOR ACCURATE SIZE MEASUREMENT-VISUALLY APPEAR TO BE OK
*
 A070  F          5                           8     * 1                             R 4           4   1   1         * 1     * 1
*MM-C:SEAT TO BEAM WELD IS MISSING ; WD-G:GRINDING ; IJ-B:UNABLE TO ACCURATELY MEASURE SIZE BECAUSE OF GRINDING
*
 A071  F              2       1     * 1       8 * 1                                   6           5       1
*WD-C:DEFECT LENGTH IS 3/4  MAXIMUM ; WD-F:BEAD SEPARATED,FULL LENGTH
*
 A072  F          2   7 * 1                   5                                     R 4           2
```

```
.   AUXILIARY BUILDING                                                    F004532
*     .                     .                                               .         AWS WELDING REPORT, APPENDIX D, PAGE 6
*JOINT.TYPE       U S       .                     W D                       .     I C       . U R   .  U C  .     M M   .  I J   GN
*     .       A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
*=====.====.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.
*US-D:UNDERSIZED DUE TO 1/8  FIT-UP GAP
*
 A073  F               9             * 1       4                         * 1           5           2
*WD-L: COLDLAP  AT WELD'S END(DEFECT LENGTH IS 1/4 )  ; WD-C:DEFECT LENGTH IS 1/4
*
 A074  F           3   5                       6                                       5           3
*
 A075  F     R 1   2                           6                                       5                                     * 2
*IJ-B:LOCATED IN BLOCKWALL
*
 A076  F                 *R1         *R1       3                                     R 4           1
*WD-C:DEFECT LENGTH IS 1/4    ; US-D:UNDERSIZED DUE TO 3/16  FIT-UP GAP
*
 A077  F         R 1   3     * 2     *R1       6                                     R 4           2                 * 4
*WD-A:DEFECT LENGTH IS 1/2    ; WD-C:DEFECT LENGTH IS 1/4
*MM-C:SEAT TO EMBED(TOP) & SEAT TO BEAM WELDS ARE MISSING-2 PLACES EACH
*
 A078  F                                     R 4                                     R 4
*
 A079  F                                     R 4                                     R 4
*
 A080  F                                     R 4                                     R 4
*
 A081  F                                                                             R 4
*
 A082  F                                     R 4                                     R 4
*
 A083  F                                     R 4                                     R 4
*
 A084  F                                     R 4                                     R 4
*
 A085  F                                     R 4                                     R 4
*
 A086  F                                     R 4                                     R 4
*
 A087  F                                                                             R 4
*
 A088  F                                                                             R 4
*
 A089  F                                                                             R 4
*
 A090  F                                                                             R 4
*
 A091  F                                                                             R 4
*
 A092  F                                                                             R 4
*
 A093  F         R 1                 * 1     R 2                                     R 4
*WD-C:DEFECT LENGTH I3 3 (LACK OF FUSION BETWEEN BEADS)
*
 A094  F                                     R 4                                     R 4
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE 7
*JOINT.TYPE       U B      .                   W D                         .      I C      .  U R  .  U C  .    M M    .  I J  GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
******.****.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.
*
 A095  F                      1             R 4                                     R 4
*
 A096  F        R 1                                                                 R 4
*
 A097  F    * 1                               6     * 1                             R 4           2
*WD-G:GOUGED ACROSS WELD BEAD(1/4  DEEP-1/8  WIDE)  ; US-A:INSUFFICIENT THROAT(1/2  LONG)
*
 A098  F        R 2     * 2                                                         R 4       2                 * X
*MM-B:BEAM SEAT IS NOT INSTALLED  ; US-D:UNDERSIZED DUE TO 1/8  FIT-UP GAP
*
 A099  F                      1                                                     R 4
*
 A100  F              2                                                               6                             * 2
*MM-C:SEAT TO BEAM WELDS ARE MISSING
*
 A101  F      2   2                                                                 R 1       4
*
 A102  F      1 R 2   1       2       2                   2                         R 1       3
*
 A103  F      2 R 1                                                                           4
*
 A104  F                                                                                      2
*
 A105  F                                                                            R 4
*
 A106  F          2                                                                 R 1       4
*
 A107  F      2                                                                               2
*
 A108  F                                                                                                                        OK
*
 A109  F          4                                                                 R 2                                     * 3
*IJ-B:INACCESSIBLE DUE TO DROPPED CEILING-MEASUREMENTS NOT OBTAINABLE
*
 A110  F          1   3                                                               5           2                         *R1
*IJ-B:EMBEDDED IN CONCRETE
*
 A111  F      1       3                                                                       3                       1       3
*
 A112  F      1                                                                     R 4
*
 A113  F          1                         R 4                                     R 4           1   1
*
 A114  F          3                 * 1                                             R 4           2
*WD-C:DEFECT LENGTH IS 3/8
*
 A115  F          5   1             * 1                                             R 4           4       1
*WD-C:DEFECT LENGTH IS 1/8
*
 A116  F                                                                            R 4
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE 8
*JOINT.TYPE       U S      .                   W D                         .      I C      .  U R  .  U C  .    M M    .  I J   GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
******.****.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.
*
 A117  F                                                                                                                * X
*IJ-A:EMBEDDED IN CONCRETE
*
 A118  F            R 1                                                             R 4
*
 A119  F                                                                                                                * X
*IJ-A:EMBEDDED IN CONCRETE
*
 A120  F      2       1                                                             R 4
*
 A121  F                                                                            R 4
*
 A122  F                                                                                                                * X
*IJ-A:EMBEDDED IN CONCRETE
*
 A123  F          1                                                                 R 4
*
 A124  F              1                                                             R 4
*
 A125  F      1                                                                     R 4
*
 A126  F            R 2                                                             R 4
*
 A127  F                                                                                                                * X
*IJ-A:EMBEDDED IN CONCRETE
*
 A128  F                                                                            R 4
*
 A129  F                                                                                                                        OK
*
 A130  F                                                                                                                        OK
*
 A131  F                                                                                                                        OK
*
 A132  F                            * 1                 * 1
*WD-C & WD-H:DEFECT LENGTH IS 3/4
*
 A133  F                                                                                                                        OK
*
 A134  F                                                                                                                        OK
*
 A135  F                                                                                                                        OK
*
 A136  F                                                                            R 2
*
 A137  F                                                                                                                        OK
*
 A138  F                                                                            R 2
*
 A139  F                                                                            R 2
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE 9
*JOINT.TYPE       U S      .                   W D                         .      I C      .  U R  .  U C  .    M M    .  I J   GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
*****.****.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.
*
 A140  F                                                                                                                        OK
*
 A141  F              2                                                             R 2
*
 A142  F                                                                            R 2
*
 A143  F                                                                                                                        OK
*
 A144  F      2             * 1                         * 1
*WD-A & WD-H:DEFECT LENGTH IS 1
*
 A145  F      3
*
 A146  F      1                                         * 1                                       * 1
*WD-G & UC-A:DEFECT LENGTH IS 1/2
*
 A147  F      1       1
*
 A148  F      1       1                                 * 1
*WD-H:DEFECT LENGTH IS NOT SPECIFIED
*
 A149  F      1
*
 A150  F                                                                                                                        OK
*
 A151  F                                                                                                                        OK
*
 A152  F                                                                                                                        OK
*
 A153  F      1       5                                                             R 2                   1
*
 A154  F                                                                                                                        OK
*
 A155  F                                                                                                                        OK
*
 A156  F                                                                                                                        OK
*
 A157  F                                                                                          1
*
 A158  F                            * 1                                                           1
*WD-C:BETWEEN BEADS(DEFECT LENGTH IS 1/4 )
*
 A159  F                            * 2                                                           3
*WD-C:DEFECT LENGTH IS 1/2  MAXIMUM
*
 A160  F                                                                                          2
*
 A161  F                                                                                                                        OK
*
 A162  F          2         * 1
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                                        AWS WELDING REPORT, APPENDIX D, PAGE 10
*JOINT.TYPE       U S      .                   W D                         .       I C     . U R   . U C   .     M M   . I J     GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
*=====.====.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.
*WD-A:DEFECT LENGTH IS 1/4
*
 A163  F                                                                                         1
*
 A164  F                                                                                                                         OK
*
 A165  F                                                         1
*
 A166  F                                                                                                                         OK
*
 A167  F                                                                                                                         OK
*
 A168  F     1               1                                   1     * 1
*WD-L:DESIGNATED AS  COLDLAP
*
 A169  F                                   R 2                                     R 2
*
 A170  F                                   R 2                                     R 2
*
 A171  F                                   R 2                                     R 2
*
 A172  F     1                             R 2                                     R 2
*
 A173  F                                   R 2                                     R 2
*
 A174  F                                   R 2                                     R 2
*
 A175  F                                   R 2                                     R 2
*
 A176  F                                   R 2                                     R 2
*
 A177  F                                   R 2                                     R 2
*
 A178  F                                     3                                     R 2   1
*
 A179  F                                                                                                                         OK
*
 A180  F                                   R 2                                     R 2
*
 A181  F                                   R 2                                     R 2
*
 A182  F                                                                                                                         OK
*
 A183  F                                                 1
*
 A184  F                                                                                                                         OK
*
 A185  F                                                                           R 2
*
 A186  F                                                                                                                         OK
*
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE //
*JOINT.TYPE       U S      :                   W D                         :     I C       . U R . U C  .    M A     . I J   GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
*=====.====.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.
 A187  F                                                                                                                        OK
*
 A188  F                                                                                                                        OK
*
 A189  F                                                                                                                        OK
*
 A190  F                                                                                                                        OK
*
 A191  F          2                                                                 R 2           2
*
 A192  F                                                                                                                        OK
*
 A193  F                                                                                                                        OK
*
 A194  F                                                                                                                        OK
*
 A195  F                                                                                                                        OK
*
 A196  F              6       1                                                                                              2 *
*GN:EXTENSIVE BASE MATERIAL DAMAGE (GOUGES) EXISTS ON EMBEDDED PLATE ADJACENT TO WELD NO. 7
*
 A197  F                                                                                                                        OK
*
 A198  F                      1
*
 A199  F                                                                                                 1                      *
*GN:JOINT IS HEAVILY OXIDIZED
*
 A200  F                      2
*
 A201  F                                                                                                                        OK
*
 A202  F                                                                                                                        OK
*
 A203  F                    * 2
*WD-A:DEFECT LENGTH IS 1/2
*
 A204  F                                                                                                                        OK
*
 A205  F                                                                                                                        OK
*
 A206  F                                                                                                                        OK
*
 A207  F                    * 1
*WD-A:DEFECT LENGTH IS 3/8
*
 A208  F                                                                                         1
*
 A209  F                                                                                                                        OK
*
 A210  F                                                                                                                        OK
```

```
.   AUXILIARY BUILDING                                                   F004532
*     .                    .                                               .        AWS WELDING REPORT, APPENDIX D, PAGE /2
*JOINT.TYPE       U S      .                   W D                         .      I C       . U R  .  U C .     M M    .  I J   GN
*     .      A   B   C   D . A   B   C   D   E   F   G   H   I   J   K   L . A   B   C   D . A   B . A   B . A   B   C . A   B
******.****.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.***.
*
 A211  F                                                                                          4
*
 A212  F                                                                                                                        OK
*
 A213  F                            * 2                                                           1
*WD-C:DEFECT LENGTH IS 1/2  MAXIMUM
*
 A214  F                    * 1
*WD-A:DEFECT LENGTH IS 1/2
*
 A215  F                                                                                          4
*
 A216  F          2                                                                 R 2
*
 A217  F          1                                                                               3
*
 A218  F          2                                                                 R 2                   1
*
 A219  F          2   1                                                                                   1
*
 A220  F                            * 1                                                           4
*WD-C:DEFECT LENGTH IS 1/8
*
 A221  F                                                                            R 2
*
 A222  F                    * 1                                                     R 2           1
*WD-A:DEFECT LENGTH IS 3/8
*
 A223  F                            * 2
*WD-C:DEFECT LENGTH IS 5/16  MAXIMUM
*
 A224  F                                                                            R 2
*
 A225  F          1                                                                 R 2
*
 A226  F                            * 1
*WD-C:DEFECT LENGTH IS 1
*
 A227  F            * 1                                                             R 2
*US-C:UNABLE TO MEASURE ACCURATELY DUE TO GRINDING-SIZE VISUALLY REJECTED
*
 A228  F                    * 1                                                     R 2
*WD-A:DEFECT LENGTH IS 1/2
*
 A229  F            R 2     * 1                                                     R 2
*WD-A:DEFECT LENGTH IS 2-3/8
*
 A230  F                    * 1
*WD-A:DEFECT LENGTH IS 1/4
*
```

```
.DATE 21 DEC 84  10:14:35  RID       1    13 NOV 84  BECHTEL
.     GENERAL NOTES        F004532
*     .                    .                                           .   AWS WELDING REPORT, APPENDIX D, PAGE 1 of 118
*JOINT.TYPE   ' U S        .                WD                         .   I C      . U R  . U C  .   M M    . I J  G N
*     .     A   B   C   D .A   B   C   D   E   F   G   H   I   J   K   L .A   B   C   D .A   B .A   B .A   B   C .A   B
*=====.====.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.===.
*
*     JOINT TYPE                  F) BEAM FRAMING CONNECTION
*                                 O) OTHER
*
*     (US) UNDERSIZED             A) UNDERSIZED FOR PART OF LENGTH
*                                 B) ONE LEG UNDER SIZED
*                                 C) FULL LENGTH UNDERSIZED
*                                 D) UNDERSIZED DUE TO FIT-UP/ROOT GAP
*
*     (WD) WELD DEFECTS           A) OVERLAP
*                                 B) INCOMPLETE PENETRATION
*                                 C) LACK OF FUSION
*                                 D) EXCESSIVE REINFORCEMENT
*                                 E) EDGE CONSUMPTION
*                                 F) CRACKED
*                                 G) GOUGED/GRINDING
*                                 H) SLAG
*                                 I) POROSITY
*                                 J) ARC STRIKE
*                                 K) CONVEXITY
*                                 L) OTHER
*
*     (IC) INCORRECT CONFIGURATION  A) GAP IN CONTINUOUS WELD
*                                 B) SPACING ON INTERMITTENT WELD
*                                 C) OVERRUN
*                                 D) WELD IN WRONG LOCATION/NOT WELDED PER DRAWING (RE: BEVEL VS. FILLET, ETC.)
*
*     (UR) UNDERRUN               A) GREATER THAN 1 INCH
*                                 B) LESS THAN 1 INCH IN LENGTH
*
*     (UC) UNDERCUT               A) MAJOR/LENGTH NOT NOTED
*                                 B) MINOR, LESS THAN 1 INCH
*
*     (MM) MISSING MATERIAL       A) MATERIAL CHANGE-OUT
*                                 B) MISSING MATERIAL      .
*                                 C) MISSING WELD
*
*     (IJ) INACCESSIBLE JOINT     A) TOTAL JOINT INACCESSIBLE
*                                 B) WELD INACCESSIBLE/INDETERMINATE
*
*
*     (GN) GENERAL NOTES          OK) ALL WELDS  ACCEPTED
*
*      R  FLAG IN DEFECT COLUMN INDICATES ALL DEFECTS ON END RETURN ONLY.
*      *FLAG IN DEFECT COLUMN INDICATES THAT A NOTE IS APPLICABLE.
*
*      NOTE:  DEFECTS ARE TABULATED FOR ALL WELDS NOT INDICATED AS  ACCEPTED  ON INSPECTION REPORT FORM.
*
              ..... END REPORT .....
```

LIST OF FIELD CHANGE REQUEST

1-0860-C
1-0901-C
1-0917-C
1-0928-C
1-0957-C
1-0974-C
1-0993-C
1-1007-C
1-1434-C
1-1440-C
1-1590-C

Bechtel Power Corporation
Engineers — Constructors

P O Box 42
New Strawn, Kansas 66839

December 28, 1984

Mr. Gary L. Fouts
Construction Manager
Wolf Creek Generating Station
Kansas Gas and Electric Company
Post Office Box 309
Burlington, Kansas 66839

BLKES-1364
SNUPPS Project
Bechtel Job 10466-003
Files: 0266.2
Inspection of Painted Welds

Reference 1: BLKES-1348

Dear Gary:

As previously stated on Page 2 of the Attachment on Reference 1, we are now able to furnish the number of uncoated welds.

> "Visual reinspection of 1090 uncoated welds in the structural steel at WCGS has, in fact, shown no evidence of weld cracking or porosity, and only 107 cases of minor undercut."

Should you have any questions, please contact me.

Sincerely,

C.M. Herbst

C. M. Herbst
Asst. Proj. Engineer

CMH/ds
cc: M. Johnson
J. Harvey
R. Brown
J. Bailey

Bechtel Power Corporation
Engineers — Constructors

P.O. Box 42
New Strawn, Kansas 66839

NOV 05 1984

RECEIVED
NOV 5 1984
SITE CONSTRUCTION

Mr. Gary L. Fouts
Construction Manager
Wolf Creek Generating Station
Kansas Gas and Electric Company
Post Office Box 309
Burlington, Kansas 66839

BLKES-1348
SNUPPS Project
Bechtel Job 10466-003
Files: 0266.2,
Inspection of Painted Welds

Attachment: Visual Inspection of
Painted Fillet Welds

Dear Mr. Fouts:

Pursuant to KG&E's request, the Bechtel Engineering position for Visual Inspection of painted welds in accordance with AWS D1.1 is attached.

Should you have any questions, please contact me.

Sincerely,

C. M. Herbst

C. M. Herbst
Assistant Project Engineer

CMH/WP/15

cc: M. Johnson w/1
J. Harvey w/1
R. Brown w/1
J. Bailey w/1
G. Fouts w/1
F. Duddy w/1

BLKES

VISUAL INSPECTION OF PAINTED FILLET WELDS

Summary of Bechtel's Position

With the exception of a number of attributes, fillet welds which have been coated with up to 4 mils of primer and in some cases, up to an additional 10 mils of topcoat can be visually inspected to the AWS D1.1 acceptance criteria. Those attributes which cannot be fully evaluated are of little or no concern on the structural steel at WCGS.

Evaluation of Physical Characteristics

The following characteristics can be fully evaluated to the design requirements and AWS D1.1 acceptance criteria with the primer and, in some cases, a topcoat applied:

- Weld presence and location
- Weld length
- Weld size, both leg length and throat thickness
- Weld profile, including convexity and concavity
- Fusion between weld metal and base metal
- Overlap
- Cross-section of weld craters
- Coarse undercut
- Large porosity

The presence of the coatings should not in any way detract from measuring, with adequate accuracy, any of these characteristics.

Evaluation of Metalurgically Induced Characteristics

The following characteristics are more difficult to evaluate and measure in the presence of the coatings, and in some cases may not be visible at all:

- Weld cracking
- Fine porosity
- Tight undercut

The application of primer and top coat may partially or fully obscure these attributes, all of which are largely dependent on the "metallurgical" characteristics of the base materials being joined, the welding filler materials being used, and the ability of the welders performing the work.

The base material used for all the structural steel at Wolf Creek is ASTM A36. This material is a low-carbon, highly weldable steel, and is, by far, the most commonly used structural steel within the U.S. Its composition and strength are highly compatible with those of the welding materials, Type E7018 electrodes, used to join the steel; that is, there is no connotation of "dis-similar" materials, which can frequently lead to metallurgically induced welding problems.

Weld cracking is frequently caused by high carbon and alloying element content of the base material or welding materials, or by high non-metallic element content, such as sulphur. Neither A36 nor E7018 have any of these adverse compositions.

The compatibility between the ASTM A36 steel and the type E7018 welding electrodes results in sound, crack- and porosity-free welds, provided a number of basic precautions are taken. These precautions include proper fit-up of weld joints, absence of restraint during welding, application of preheat for thicker members, and use of appropriate welding parameters. All these items are described or defined in the welding procedure specifications required by AWS D1.1, and used by the constructor. Bechtel has reviewed and accepted these welding procedures as being suitable for the work at Wolf Creek.

Porosity can be caused by poor welding electrode control and issue. Type E7018 electrodes contain a "low-hydrogen" coating, which tends to absorb moisture during storage, which in turn can give rise to porosity during welding. Great emphasis is placed, therefore, on the correct storage and issue procedures for this type of welding electrode. They are stored in heated ovens and issued in limited quantities, and unused electrodes are carefully reheated or baked prior to reissue. These precautions have been standard for many years now, and through their use, coupled with use of the proper welding parameters, porosity is not a concern.

The presence or absence of undercut along fillet weld edges is dependent on the base material, welding process and materials, welding parameters and welder ability. The first three of these criteria have been addressed in the discussion on cracking and porosity, and for the base materials, welding process and materials and welding parameters used at Wolf Creek would not lead to weld undercut in themselves. However, the formation of undercut during welding is dependent to a large degree on welder ability. The correct combination of travel speed, current, arc length, electrode angle, weave, electrode size, etc., are all important in preventing undercut. The welder training and certification program used by the constructor, along with the qualification tests required by AWS D1.1, are all designed to provide the welders with the ability to control these attributes.

Throughout past inspections, and current inspections on uncoated welds, cracking, porosity and undercut have not been identified as generic problems, which, if they occur, tend to be widespread. Visual reinspection of (later) uncoated welds in the structural steel at WCGS has, in fact, shown no evidence of weld cracking or porosity, and only (later) cases of minor undercut. We contend, therefore, that the lack of ability to identify these attributes on coated welds should not be considered detrimental to the reinspection program, since there is no reason to believe that they may be present. The reinspection program should continue to identify those concerns that may have some effect on the design capability of the structures.

ATTACHMENT 5

FORM 1177 REV 1-67

KGE
THE ELECTRIC COMPANY

INTEROFFICE CORRESPONDENCE

TO: G L Fouts KNPLKWC 84-265 TE - 08438-003

FROM: J A Bailey

DATE: November 13, 1984

SUBJECT: Inspection of Painted Welds

REF: 1) BLKES-1348

NPE is in concurrance with the Bechtel position stated in the referenced letter above.

John A Bailey

NWH/JABailey:dab

cc - M L Johnson (MS3-01)
J Fletcher
C M Herbst
R W Grant
C M Sprout (MS3-01)
N W Hoadley

of the plant. In addition, the grinding itself may cause other safety problems.

III. UNDERCUT PROVISIONS OF AWS D1.1

The third problem regarding welding pertains to weld undercut. Early editions of AWS D1.1 prohibited undercut and the current issue has a restriction on the depth of undercut which is based on the direction of the principal stress in the welded member. These rules are impossible to follow, because undercut can not be eliminated completely and the Inspectors do not know the direction of primary stress when performing inspections. The problem caused by these provisions have been discussed with members of AWS D1.1 technical staff, but these men are reluctant to revise the document because there have been no major industry complaints. This reluctance only means that the provisions of the document are not enforced, or as permitted by AWS D1.1, the provisions are waived by the designers. The minimum weld undercut allowed by AWS D1.1 (0.01 inch) cannot be measured, so the restriction is ridiculous.

Section III, NB-4424(c), allows 1/32 inch undercut. Designers have not had a problem with this provision, and the Inspectors have been able to make adequate evaluations based on this provision.

A problem arises when NRC Inspectors become overly strict and insist on no undercut at all. Some Inspectors have rejected ASME structural welds on the basis of the old AWS D1.1 requirements which were written primarily for bridges and buildings. One NRC Inspector rejected a weld undercut because it was 1/64 inch deeper than permitted by Code. This leads to more weld repairs which is a safety concern.

IV. ENCROACHMENT ON MINIMUM THICKNESS

There are cases where Inspectors have noted that minimum thickness requirements may not be met for local areas of the items being inspected. These local thin areas may be caused either by undercut or grinding. The resultant weld repairs to restore minimum thickness can cause more problems than accepting the area on the basis of engineering evaluation.

The ASME Code philosophy of design allows local discontinuities. The design engineer can often justify the shallow spots by showing that the local area involved is less in diameter than the Code allowed diameter of an unreinforced opening. Also, the ASME Code allows areas around discontinuities to have an increased primary stress of up to 110% of the allowable stress. When the design engineer uses these

LEHIGH UNIVERSITY
Bethlehem, Pennsylvania 18015

Fritz Engineering Laboratory
Building 13

December 10, 1984

Mr. Richard Ivy
Kansas Gas and Electric Company
P.O. Box 208
Wichita, Kansas 67201

Dear Mr. Ivy:

Re: Structural Steel Welds at
Wolf Creek Generating Station

We have reviewed the problems associated with the structural welds in the structures at the Wolf Creek Generating Station. Dr. Slutter was on the site on November 1 and 2, 1984 to observe firsthand some of the weld deviations, the method of inspection, inspection records, and problems encountered in completion of the inspection program. The problems encountered at this site are not unlike structural welding problems that we have seen at other nuclear power plants. The problems at Wolf Creek are perhaps more frustrating but less serious than similar problems at other sites. The approach being used by Bechtel as summarized in "Weld Deviation Evaluation Methodology" dated November 26, 1984 has also been reviewed.

The examination of the welds in this reinspection program is very thorough, as evidenced by the documentation on every connection. The thoroughness of the inspection has revealed some problems that require evaluation from a structural analysis point of view and a much larger number of instances where deviations from AWS D 1.1 - 1975 are reported that do not constitute structural deficiencies. It appears from the latest summary of inspection and evaluation received from Bechtel (dated November 27, 1984) that no significantly deficient joints have been found.

We have the following comments on the various categories of problems that have been found in the reinspection:

1. Missing Welds

   Obviously the missing welds should be replaced if they are needed to resist design loads. Some of these welds such as the beam to beam seat welds may not be required, and replacement should not be necessary. Where they are inaccessible and cannot be replaced, an appropriate analysis of the other load paths should be provided.

2. Undersize, Unequal Leg, and Underlength Welds

The approach that is being used to evaluate these types of conditions using the smallest weld dimension is very conservative. Welds that are no more than 1/16 in. undersize will have adequate strength on the basis of the latest code recommendations. The allowable stresses being used by Bechtel from the Seventh Edition AISC provide a conservative basis for evaluation.

3. Oversize and Overlength Welds

These deviations are not generally a problem to be concerned about. There are some instances where the additional amount of weld causes the connection to provide more restraint than intended. The original design actually specified this additional welding. In these structures the additional weld metal should not cause problems. End rotation and the resulting connection deformation can result in cracking of the welds if the additional weld increases the bending stiffness of the connection and decreases ductility.

4. Cracked Welds Between Beam and Beam Seat

These cracks resulted from rotation of the end of the beam as concrete slabs were poured and additional dead load was placed. The cracking does not indicate a deficiency in the connection since the weld is not needed. The cracked welds that were detected were probably undersize because of the rolled edges of the members being joined.

5. Return Welds That Are Overlength But Undersize

The purpose of this weld is to produce a proper termination for the vertical weld. It is not necessary that it meets AWS 1.1 - 1975 size requirements, since it is not needed structurally. The added length can increase capacity in some instances. The primary objective of end returns is to minimize prying and distortion at the root of the primary weld.

6. Lack of Fusion and Undercut

These problems are very few in number and are being satisfactorily handled in the analysis.

7. Beam Seat Missing

These may not be needed but an analysis of each one is being made. It is assumed that seats will be provided if needed.

8. Fit-Up Gap with Undersize Weld

This is a rare occurrence considering structures involved. Proper analysis of this is being made by Bechtel.

9. Inaccessible Welds

Since there are no significant structural deficiencies among the exposed welds inspected, it is reasonable to assume that the inaccessible welds are similar.

The general problem of weld size should be considered in terms of the expected statistical variation of weld dimensions in typical structural welding where the AISC allowable stresses are applicable. Enclosed are Fig. a through Fig. e showing the statistical variation of the 1/4 in., 3/8 in., and 1/2 in. welds used to develop the AWS and AISC specification provisions. These curves show the deviation in weld sizes that are to be expected with production welds. The variation of weld capacity that resulted from the AWS-AISC fillet weld study in 1968 was in part due to the variation in weld size that existed with the test sample. These were normal production welds, and similar deviations will exist with all welds. Figure 19.3 in Structural Steel Design shows the shear strength based on nominal weld size. It is clear that part of the reason for the variation in capacity is based on the weld size variation.

When a weld is found to be undersize by measurement, it is not significant unless it falls below the range indicated by the curves. The AWS Specification does not address the problem of deviations, and disposition of undersize welds must be done using the type of analysis that Bechtel has proposed. The fact that they are using actual weld sizes in calculations is conservative, since the specifications used the lower bound of the test data which included weld undersize.

Weld size deviations on the return welds does not require analysis. These welds are not intended to increase the strength of the connection, although some additional strength does result from the addition of these welds. The main function of return welds is to increase the ultimate strength of the structure by delaying end tearing of the weld and improving the ductility of the connection. These welds need not be held to exact dimensions but should be large enough to provide a satisfactory weld termination.

The analysis work being done by Bechtel is based on elastic design with reference to the Seventh Edition of the AISC Manual of Steel Construction. This approach is conservative compared to the ultimate strength method available in the Eighth Edition and the current approach used in LRFD design as given in Load and Resistance Factor Design Criteria for Connectors*. One of the provisions of the earlier specification that is very conservative and not applicable to weld capacity is the allowable stress for base metal in shear given as $F_v = 0.4\ F_y$. This limit state was arbitrarily adopted in 1969 and is not related in any way to weld capacity. This is only now being corrected in the AISC Specifications. The attached copy of Table J2.3 shows the proper limit state conditions that are used in the LRFD Specification. Steps are now underway to change the allowable stress provisions for shear on the weld leg to 0.3 F_u in place of the value 0.4 F_y. Typical increases in allowable loads for eccentric connections that one can expect to result from using the ultimate strength analysis outlined in the Eighth Edition of the AISC Manual can be seen by comparing the results given in Table III on page 4-31. With a weld length of 11.5 in., the C-shaped weld and the outstanding angle vertical welds are similar to the welded example shown on page 661 of the second edition of Structural Steel Design. The ultimate strength analysis of the clip angle to plate welds provides an 8% increase in load. The C-shaped welds of the clip angles to beam web are permitted to carry 22% more load using the ultimate strength method. This can also be seen by comparing the standard angle connection loads in the Seventh and Eighth Editions of the AISC Manual.

The AISC provisions for the design of this type of connection are very conservative even when one uses the ultimate strength method. The minimum factor of safety for a connection designed by the ultimate strength method is given as 3.33 on page 4-74 of the Eighth Edition of the AISC Manual. The usual factor of safety in weld design for single load vectors is 2.33. The more conservative design for this type of connection recognizes that minor deviations such as found in the connections at Wolf Creek Generating Station will occur. These deviations are not uncommon, and this is recognized by the AISC provisions. In particular, the weld size variations are typical where fillet welds are used. The higher factor of safety in use for eccentric joints recognizes that other deviations are likely.

We do not believe that a structural problem exists with the Wolf Creek welds once the obvious problem of missing welds has been corrected. In the November 27, 1984 summary, Bechtel reports only 17 joints requiring rework due to overstress of 1620 joints evaluated. This is a very low percentage in view of the conservative approach being used in the analysis. A less conservative approach might result in an even smaller number of joints requiring rework.

*Load and Resistance Factor Design Criteria for Connectors, by J. W. Fisher, T. V. Galambos, G. L. Kulak, and M. K. Ravindra, Journal of the Structural Division ASCE, Vol. 104, No. ST9, September 1978.

In any event we feel that Bechtel's approach in considering the inspection reports and their subsequent analysis is adequate and sufficiently conservative for the type of structures and the type of connections involved. The overall quality of the welds based on the inspection data and observations that we have made exceeds the requirements for structural welding for this type of construction.

We would be pleased to examine other Bechtel dispositions when they are available. We agree with the procedure being used.

Sincerely yours,

John W Fisher

John W. Fisher
Professor of Civil Engineering
Co-Chairman, Fritz Engineering Laboratory

Roger G. Slutter
Professor of Civil Engineering
Director Operations Division

JWF:RGS:rag

Enclosures

cc: J. A. Bailey

Not in the ASD Spec

Table J2.3
Design Strength of Welds

Types of Weld and Stress[a]	Material	Resistance Factor φ	Nominal strength F_{BM} or F_w	Required weld strength level[b,c]
Complete Penetration Groove Weld				
Tension normal to effective area	Base	0.90	F_y	"Matching" weld be used
Compression normal to effective area				Weld metal with a strength level equal to or less than "matching" may be used
Tension or compression parallel to axis of weld				
Shear on effective area	Base Weld elect.	0.90 0.80	$0.60F_y$ $0.60F_{EXX}$	
Partial Penetration Groove Welds				
Compression normal to effective area	Base[e]	0.90	F_y	Weld metal with a strength level equal to or less than "matching" weld metal may be used
Tension or compression parallel to axis of weld				
Shear parallel to axis of weld	Base[e] Weld elect.	0.75 0.75	$0.60F_u$ $0.60F_{EXX}$	
Tension normal to effective area	Base[e] Weld Electrode	0.90 0.80	F_y $0.60F_{EXX}$	
Fillet Welds				
Stress on effective area	Base[e] Weld elect.	0.75 0.75	$0.60F_u$ $0.60F_{EXX}$	Weld metal with a strength level equal to or less than "matching" weld metal may be used
Tension or compression parallel to axis of weld[d]	Base[e]	0.90 F_y		
Plug or Slot Welds				
Shear parallel to faying surfaces (on effective area)	Base[e] Weld elect.	0.75 0.75	$0.60F_u$ $0.60F_{EXX}$	Weld metal with a strength level equal to or less than "matching" weld metal may be used

[a] For definition of effective area, see Section J2.

[b] For "matching" weld metal, see Table 4.1.1, AWS D1.1.

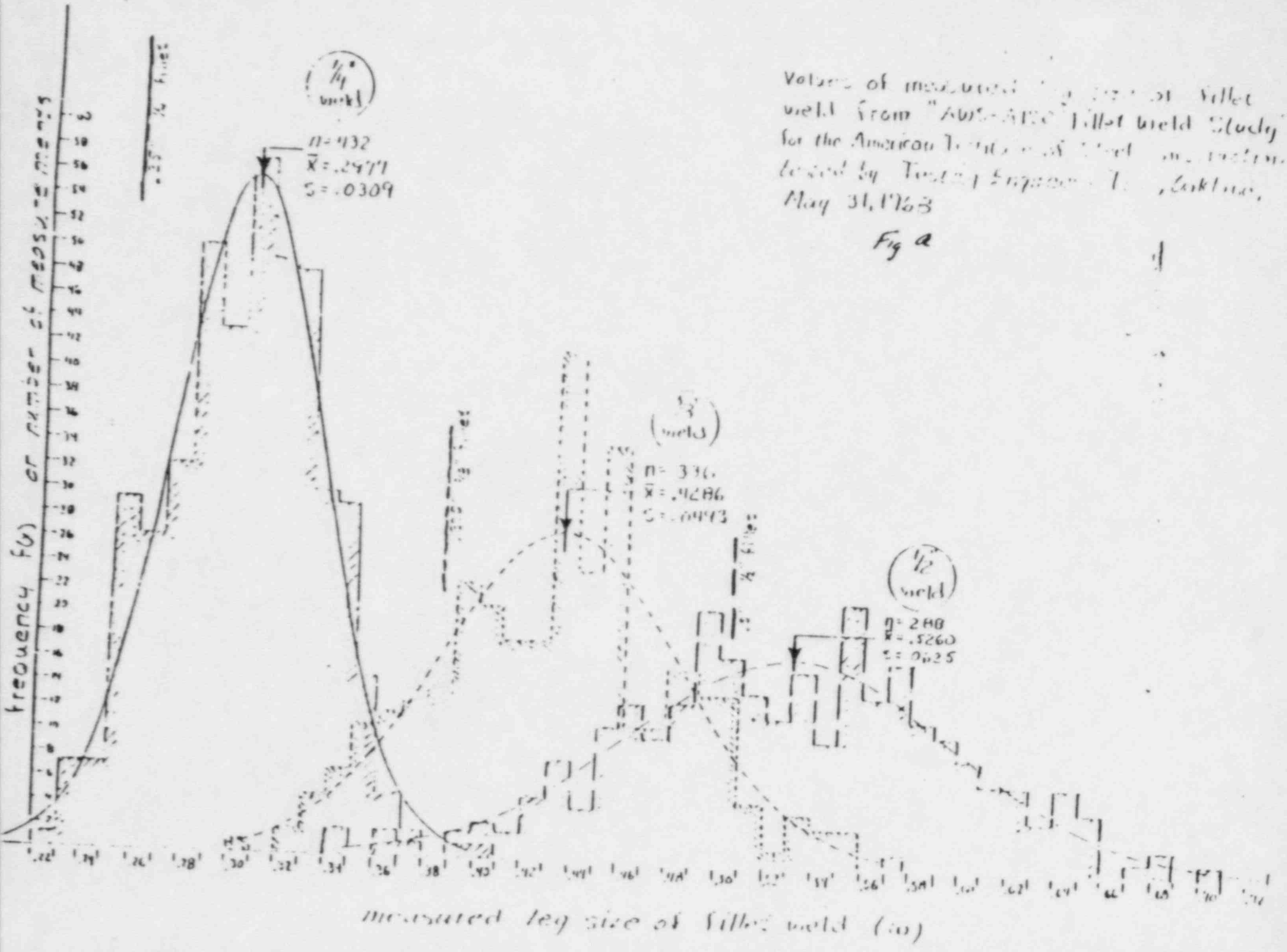
[c] Weld metal one strength level stronger than "matching" will be permitted.

[d] Fillet welds and partial penetration groove welds joining component elements of built-up members, such as flange to web connections, may be designed without regard to the tensile or compressive stress in these elements parallel to the axis of the welds.

[e] The design of connected material is governed by J4.

Values of measured leg size of fillet weld from "AWS-AISC Fillet Weld Study" for the American Institute of Steel Construction, tested by Testing Engineers Inc., Oakland, May 31, 1968

Fig a



Original values of measured leg size of fillet weld from 'AWS-AISC Fillet Weld Study' for the American Institute of Steel Construction tested by Testing Engineers Inc. Oakland, Cal.
May 31, 1968

Fig b

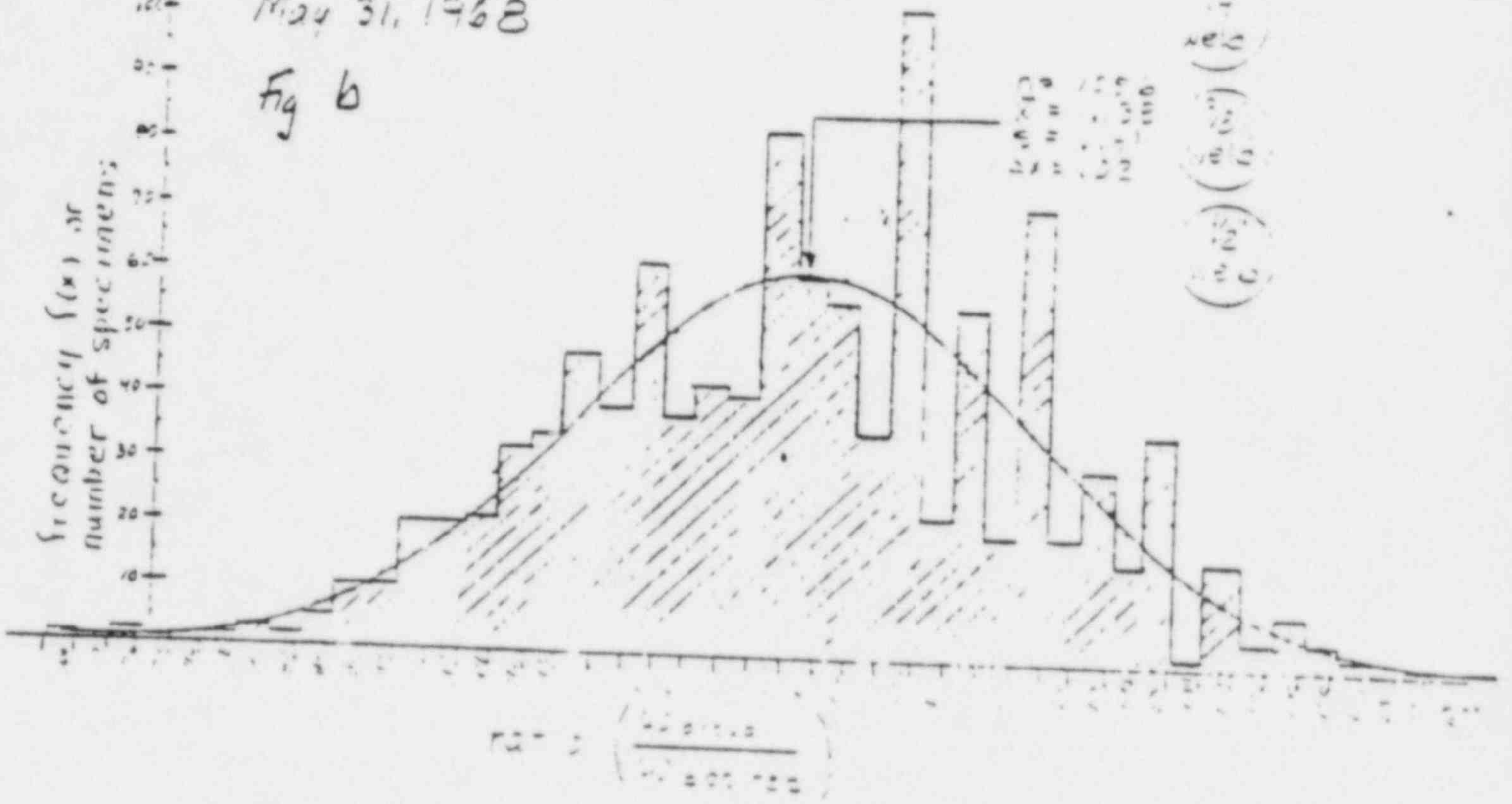


Fig C

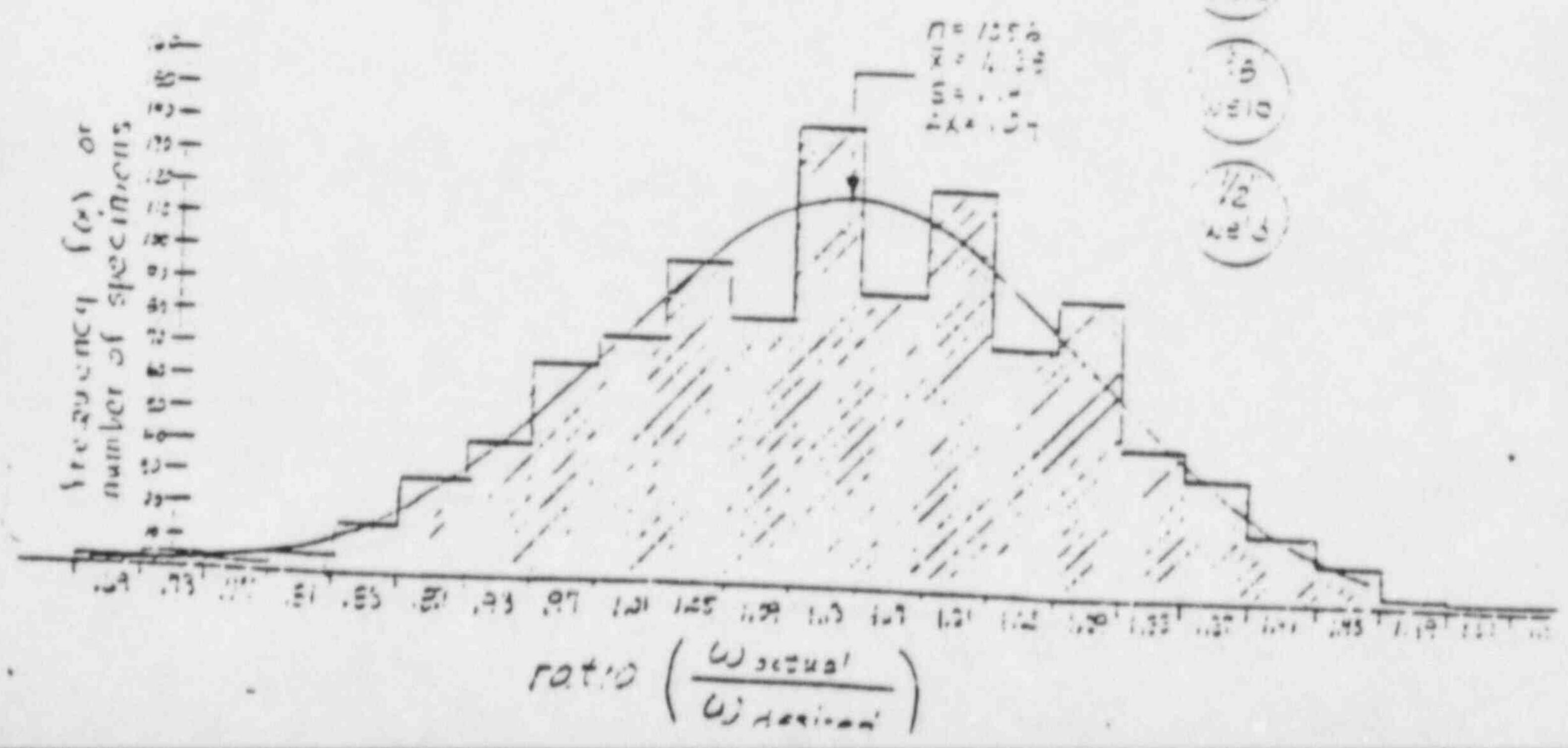
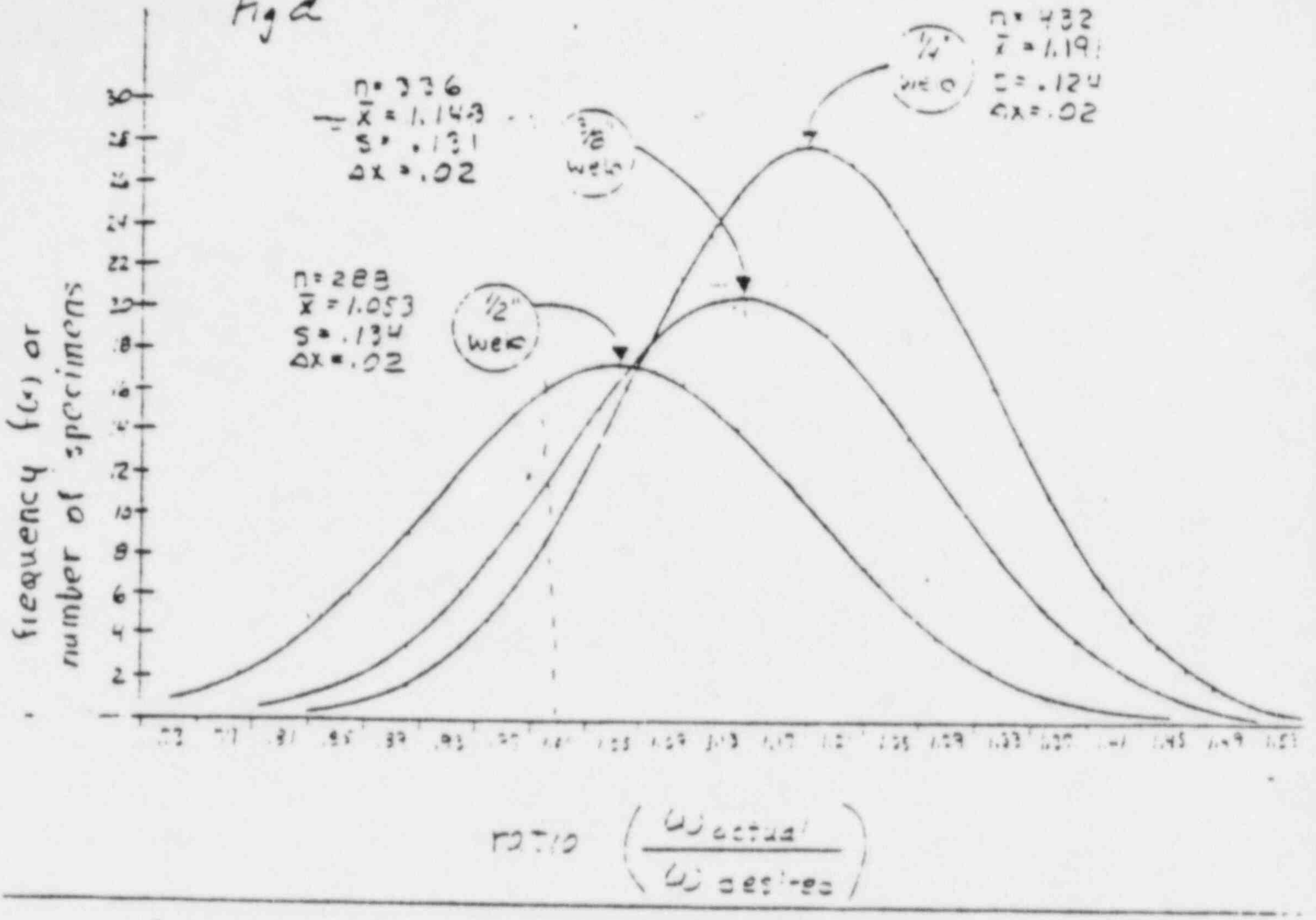


Fig d



Correspondence from Mr W C Cad..ell, Asst Ch. Eng of Caterpillar Tractor Co Peoria, Ill Dec 22, 1964

Of 925 fillet welds checked, from 1/8" to 1/2"

688 (74.4%) from nominal (1.0) to 25% oversize (1.25)

96 (10.4%) exceeded 25% oversize (1.25)

141 (15.2%) under nominal size (1.0)

from this data ;

15.2% corresponds to 1.
10.4% corresponds to 1.
$x_1 = \bar{x} - K_1 S$
$1.0 = \bar{x} - 1.028 S$
and
$x_2 = \bar{x} + K_2 S$
$1.25 = \bar{x} + 1.259 S$
from this we get $\bar{x}$ = 1.
S = ..

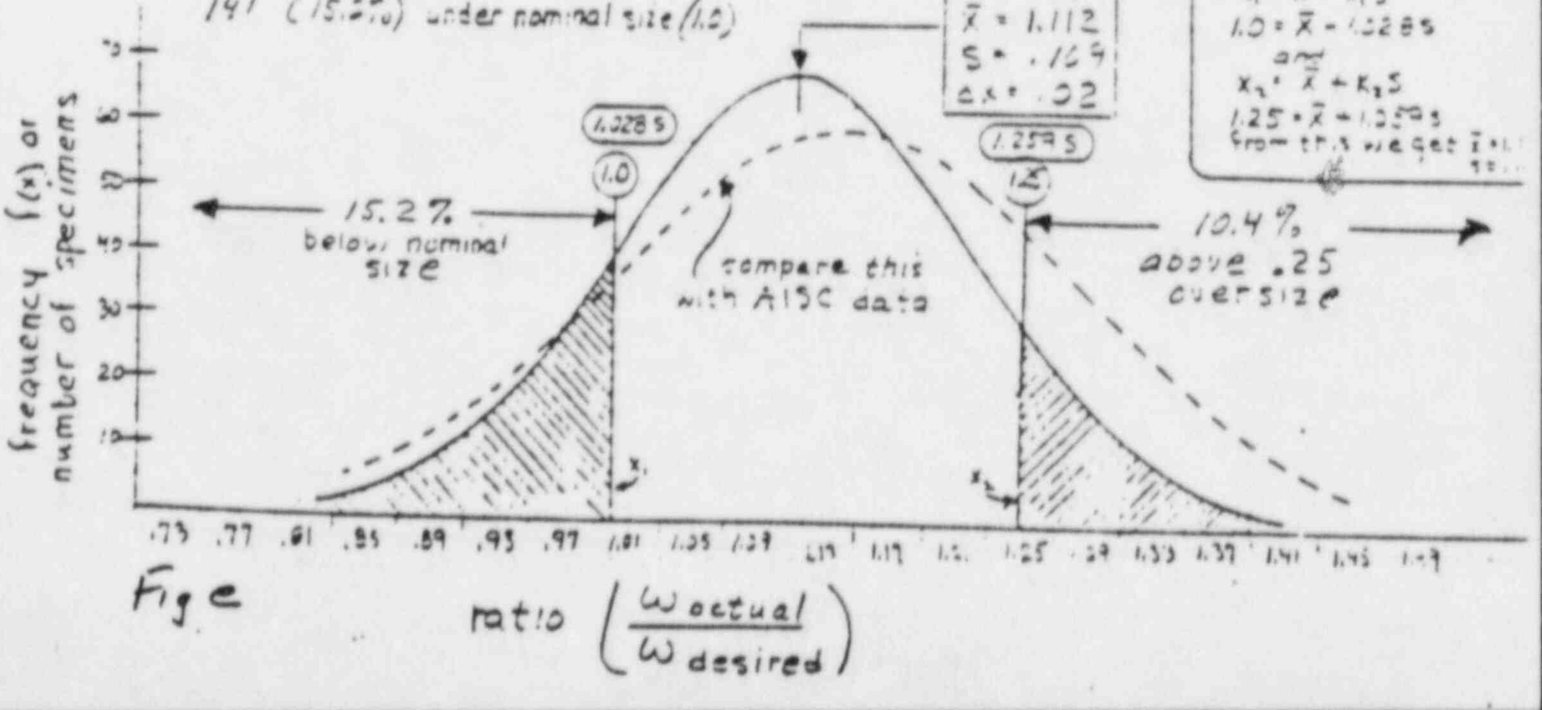


Fig e

7. Johnson, R P , "Research on Steel-Concrete Composite Beams," *Journal of the Structural Division*, ASCE, Vol 96, No ST3, Proc Paper 7122, Mar , 1970, pp 445-459
8. Johnson, R P , and Hope-Gill, M C , "Application of Simple Plastic Theory to Continuous Composite Beams," *Proceedings of the Institution of Civil Engineers*, Part 2, Vol 61, Mar , 1976, pp 127-193
9. Ollgaard, J G , Slutter, R G , and Fisher, J W , "Shear Strength of Stud Connectors in Lightweight and Normal Weight Concrete," *American Institute of Steel Construction Engineering Journal*, Vol 8, No 2, Apr , 1971, pp 55-64
10. Ravindra, M K , and Galambos, T V , "Load and Resistance Factor Design for Steel," *Journal of the Structural Division*, ASCE, Vol 104, No ST9, Proc Paper 14006, Sept , 1978, pp 1443-1457
11. Slutter, R G , and Driscoll, G C , Jr , "Flexural Strength of Steel-Concrete Composite Beams," *Journal of the Structural Division*, ASCE, Vol 91, No ST2, Proc Paper 4294, Apr , 1965, pp 71-99
12. *Specification for the Design, Fabrication and Erection of Structural Steel for Buildings*, American Institute of Steel Construction, 1978
13. "Steel Structures for Buildings—Limit States Design," *CSA Standard S16 1-1974*, Canadian Standards Association, Rexdale, Ontario, Canada, Dec , 1974

JOURNAL OF THE
STRUCTURAL DIVISION

LOAD AND RESISTANCE FACTOR DESIGN CRITERIA FOR CONNECTORS*

By John W. Fisher,[1] Theodore V. Galambos,[2] Fellows, ASCE,
Geoffrey L. Kulak,[3] and Mayasandra K. Ravindra,[4]
Members, ASCE

INTRODUCTION

Design criteria based on the Load and Resistance Factor Design (LRFD) approach must include a treatment of connections This report will focus on development of the criteria necessary for the principal fastening elements (welds, high-strength bolts, and ordinary bolts) and will include illustrations of the application of these elements in common types of joints Comparison will be made with results achieved using working stress design

As developed in Ref 11, the LRFD method can be synthesized as

$$\phi R_n \geq \sum_{k=1}^{r} \gamma_k Q_{km} \quad (1)$$

The left-hand side of Eq 1 is the resistance of the member or structure (R_n is the nominal resistance and ϕ is a "resistance factor"), while the right-hand side gives the effects of the load on the member or structure Considering, for example, only dead load and live load, Eq 1 would be written

$$\phi R_n \geq \gamma_D Q_{Dm} + \gamma_L Q_{Lm} \quad (2)$$

in which Q_{Dm} and Q_{Lm} are the mean dead and live load effects, respectively; and γ_D and γ_L are the corresponding load factors The principal purpose of this paper is to develop expressions for the parameters ϕ and R_n in Eq 1

Note.—Discussion open until February 1, 1979 Separate discussions should be submitted for the individual papers in this symposium To extend the closing date one month, a written request must be filed with the Editor of Technical Publications, ASCE This paper is part of the copyrighted Journal of the Structural Division, Proceedings of the American Society of Civil Engineers, Vol 104, No ST9, September, 1978 Manuscript was submitted for review for possible publication on May 15, 1978

*To be presented at the October 16-20, 1978, ASCE Annual Convention & Exposition, held at Chicago, Ill

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The development will be based on the use of first-order probabilistic methods.

The fundamental requirements for a well-designed connection can be considered to be:

1. Adequate Strength—It is generally considered good practice that the connections be somewhat stronger than the parts being joined. Thus, if failure should occur, it will take place in the members rather than in the connections thereby ensuring that ample warning (e.g., large deflections) will precede failure.
2. Adequate Ductility—Care must be taken in proportioning the elements of the connection to ensure that ductile behavior will result. Of course, such undesirable phenomena as buckling of plate elements, brittle fracture, lamellar tearing, and excessive local distortion must be avoided. Provision of adequate ductility will mean that the structure containing the connection will have capacity for distortion before failure and will allow for the redistribution of loads. The provision of adequate ductility is a requirement generally less well-defined or understood than that of adequate strength.
3. Economy—As for all structural components, it is desirable that connections be economical of material and be as simple as possible in fabrication.

In working stress design, specifications (13) customarily specify allowable stresses and give rules regarding buckling problems and the like. Although not necessarily obvious, most allowable stresses for fastening elements and most rules for proportioning connections are, in fact, based on ultimate strength considerations. "Traditional" design of connections is much closer to the LRFD approach than most users of these specifications perhaps realize.

CALIBRATION OF CONNECTOR DESIGN REQUIREMENTS

The load factors, γ_k, and the resistance factor, ϕ, in Eq. 1 depend upon a "safety index," β, that is obtained by calibration to existing standard designs (11). Thus, it is intended that successful past practice will be the starting point for LRFD. For beams and columns, it has been found that a value of β = 3.0 provides a good estimate of the reliability inherent in current design. This value has been taken also as the basis for LRFD criteria for all other types of structural members. In view of the desirability that connections have a higher degree of reliability than the members they join, the safety index β for connections should be somewhat larger than this value of 3.0.

The calibration procedure used here is the same as that followed for beams and columns (11). It will be carried out for various combinations of dead and live load and will cover welds, high-strength bolts, and ordinary bolts.

The safety index β is defined (11) as

$$\beta = \frac{\ln \dfrac{R_m}{Q_m}}{\sqrt{V_R^2 + V_Q^2}} \qquad (3)$$

in which R_m and Q_m are the mean values of the resistance and the load effect; and V_R and V_Q are the corresponding coefficients of variation. Detailed definitions of these quantities can be obtained from Ref. 11.

Welds.—The weld types used for structural purposes are primarily the groove weld and the fillet weld. In the case of groove welds, the forces acting are usually tensile or compressive. Tests have shown that complete penetration groove welds of the same thickness as the connected part are capable of developing the full capacity of that part. Since it is normal to use weld metal that is at least as strong as the base metal, this means that the properties of the base metal will govern the design. Thus, when complete penetration groove welds are used, design can be based on the properties and behavior of the member in which the connection is being made.

The ultimate strength of fillet welds subjected to shear (the usual case) is dependent upon the strength of the weld metal and the direction of the applied load. The weld may be parallel to the direction of the load (a "longitudinal" fillet weld), transverse to the direction of the load (a "transverse" fillet weld), or at any angle in-between. Regardless of the orientation, the welds fail in shear, although the plane of rupture varies. All experimental studies have shown that longitudinal fillet welds provide lower strength but higher ductility than transverse fillet welds (1,2,7). Since in complex joints it is not always possible to define the direction of loading on the weld and since the longitudinal fillet welds provide the lower bound to weld strength, they will be used here to provide the basis for design recommendations. The results can then be applied in general to fillet welds without reference to the direction of loading.

Early tests on low carbon steels connected by manual arc longitudinal fillet welds showed that the ultimate shear strength on the minimum throat area was 65%-85% of the tensile strength of the deposited material (4,6,12). These early studies also showed that shear yielding was not critical in fillet welds because the material strain-hardened without large overall deformations occurring. Thus, the yield point of fillet welds is not considered a significant parameter.

More recent tests on a wide range of steels connected with "matching" electrodes have provided data on strength and its variability (2,3,8,9). (For many of these tests, data were not obtained on the tensile strength of the deposited weld metal; only the shear strengths were obtained.) Blodgett gives results for 127 samples of weld metal for which the minimum specified tensile strength is 62 ksi (unpublished). The mean tensile strength value, $(\tau_w)_m$, was 66.0 ksi, the standard deviation, σ_{τ_w}, was 2.56 ksi, and the coefficient of variation, V_{τ_w}, was 0.039. For a sample of 138 specimens of E70 electrode weld metal (minimum specified tensile strength 72 ksi), Blodgett determined $(\tau_w)_m$ = 74.9 ksi, σ_{τ_w} = 2.67 ksi, and V_{τ_w} = 0.036. Unpublished studies by Nash and Holtz for the same category gave $(\tau_w)_m$ = 86.8 ksi, σ_{τ_w} = 9.88 ksi, and V_{τ_w} = 0.247 with a sample size of 40. Blodgett also obtained data from tests on weld metal made with E80, E90, and E110 electrodes. Table 1 summarizes all of the data from Blodgett's report. It is worth noting that Blodgett also obtained results for E70 electrode weld metal that were higher than those listed and comparable to the values found by Nash and Holtz. For a sample of 128 specimens made using E7024 and E7028 electrodes (minimum specified tensile strength 72 ksi), Blodgett obtained values $(\tau_w)_m$ = 85.4 ksi, σ_{τ_w} = 4.77 ksi, and V_{τ_w} = 0.056.

Until more data are available, it seems reasonable to use the lower bound results listed in Table 1 as the basis of the formulation herein. The value of the ratio of the actual tensile strength of weld metal to its minimum specified tensile strength will be taken as 1.05 with a coefficient of variation of 0.04.

This will be considered to apply to all electrode classifications being considered, i.e., E60 through E110.

Fig. 1 shows a distribution of the ratio of fillet weld shear strength to weld electrode tensile strength for a sample of 133 specimens. The weld shear strength, τ_w, is that for the appropriate matching electrode using the values described herein. These data provide the following results: $(\tau_w)_m = 0.84$, $\sigma_{\tau_w} = 0.09$, and $V_{\tau_w} = 0.10$

TABLE 1.—Fillet Weld Strength

Electrode group (1)	Minimum specification tensile stress, in kips per square inch (2)	Sample size (3)	Mean tensile stress, $(\tau_w)_m$ (4)	Standard deviation, σ_{τ_w} (5)	Coefficient of variation, V_{τ_w} (6)	Tensile stress / specification tensile stress (7)
E6010, E6011, E6027	62	127	66.0	2.56	0.039	1.06
E7014, E7018	72	138	74.9	2.67	0.036	1.04
E8018-X	80	136	87.9	4.34	0.049	1.10
E9018-X	90	16	100.2	4.32	0.043	1.11
E11018-X	110	72	116.9	4.68	0.040	1.06

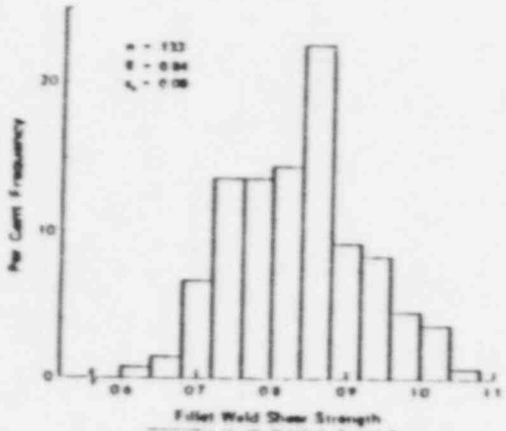

FIG. 1.—Relationship of Weld Shear Strength to Electrode Tensile Strength

The shear strength to tensile strength ratio and its coefficient of variation will be used to evaluate the safety index, β. The mean shear strength of fillet welds can be expressed as

$$(\tau_w)_m = \left(\frac{\tau_w}{\sigma_w}\right)_m \left(\frac{\sigma_w}{F_{EXX}}\right)_m F_{EXX} = 0.84 \times 1.05\, F_{EXX} \qquad (4)$$

The coefficient of variation of the resistance, V_R, required for the solution of Eq. 3 is defined as (11)

$$V_R^2 = V_M^2 + V_F^2 + V_P^2 \qquad (5)$$

in which the coefficients of variation on the right-hand side of the equation represent the uncertainties in material strength, fabrication, and a "professional" factor, respectively.

The variation in the professional assumptions reflect the accuracy with which the forces acting on the fasteners are estimated. The exact determination of these forces is highly complex and they are usually assigned according to a distribution that fulfills the static equilibrium requirements only. However, for a ductile structure, the principles of the lower bound theorem of plasticity are valid. Thus, as no error is made in statics and weld material is provided to resist the forces assigned, the joint will be safe. There is, therefore, no variability of the professional assumptions: the assigned, statically correct forces will be resisted. Accordingly, the term V_P in Eq. 5 is set at zero.

Variation in fabrication reflects the variation of the weld length and throat thickness from those assumed in the design. At the present time, there are not enough data available to obtain V_F quantitatively. A value $V_F = 0.15$ will be assumed for fillet welds. This implies that there is a 50% probability that the actual shear area will be within ±10% of the area assumed. This is believed to be a conservative assumption.

The coefficient of variation of the material strength from the statistical data available for fillet weld strength is

$$V_M^2 = V^2_{\frac{\tau_w}{\sigma_w}} + V^2_{\frac{\sigma_w}{F_{EXX}}} = (0.10)^2 + (0.04)^2 = 0.0116 \qquad (6)$$

Also needed for the calibration is the weld size required by the 1978 American Institute of Steel Construction (AISC) Specification (13). Using Part 2 of the Specification, the design criterion for a load combination of dead and live load is

$$1.7\, A_w \times 0.3\, F_{EXX} = 1.7\, c\, (D_n + L_{rr}) \qquad (7)$$

in which A_w = the cross-sectional area through the throat of the weld; D_n = the code value of dead load; L_{rr} = code live-load value as reduced for area, and c is an influence coefficient transforming load intensity to member force. [Note that the load factor (1.7) appears on both sides of Eq. 7; the result obtained here using Part 2 of the Specification are identical to that which would have been obtained using Part 1, allowable stress design, of that same specification.] The mean resistance of a fillet weld designed according to the 1978 AISC Specification is therefore

$$R_m = A_w (\tau_w)_m = \frac{c\, (D_n + L_{rr})(\tau_w)_m}{0.3\, F_{EXX}} = 2.93\, c\, (D_n + L_{rr}) \qquad (8)$$

and the corresponding coefficient of variation is

$$V_R = \sqrt{V_M^2 + V_F^2} = \sqrt{0.0116 + 0.0225} = 0.185 \qquad (9)$$

Substitution of R_m (Eq. 8), V_R (Eq. 9), Q_m, and V_Q (Ref. 11) into the expression

TABLE 2.—Safety Index β for High Strength Bolts and Fillet Welds

Dead load,* D_n, in pounds per square foot (1)	Tributary area, A_T, in square feet (2)	Safety Index, β						
		Fillet welds (3)	A325 bolts tension (4)	A490 bolts tension (5)	A325 bolts shear (6)	A490 bolts shear (7)	A325 bolts friction (8)	A490 bolts friction (9)
50	200	4.20	4.81	4.74	5.86	5.23	1.46	1.32
	400	4.44	5.28	5.31	6.36	5.77	1.58	1.44
	575	4.33	5.19	5.23	6.30	5.70	1.46	1.32
	800	4.56	5.58	5.72	6.69	6.15	1.61	1.48
	1,000	4.70	5.83	6.03	6.95	6.43	1.71	1.58
75	200	4.53	5.50	5.62	6.61	6.05	1.59	1.46
	400	4.73	5.96	6.24	7.10	6.61	1.70	1.56
	720	4.50	5.71	6.00	6.88	6.39	1.47	1.33
	1,000	4.67	6.02	6.41	7.19	6.75	1.58	1.45
100	200	4.73	5.99	6.29	7.13	6.66	1.68	1.55
	400	4.91	6.41	6.89	7.57	7.17	1.78	1.64
	600	4.82	6.34	6.86	7.52	7.13	1.68	1.55
	750	4.68	6.15	6.65	7.35	6.94	1.56	1.42
	1,000	4.80	6.38	6.96	7.57	7.21	1.64	1.51

*Live load is 50 psf for all cases

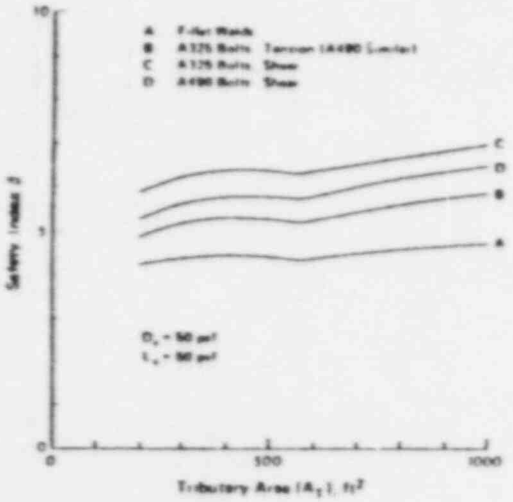

FIG. 2.—Safety Index for Various Connectors

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for the safety index β (Eq. 3) can now be performed for a variety of dead- and live-load intensities and for various values of the tributary area. Table 2 lists values of β for the basic code live-load value of L_n = 50 psf and for dead-load intensities of 50 psf, 75 psf, and 100 psf and for tributary areas ranging from 200 sq ft-1,000 sq ft. A plot of β versus tributary area is shown in Fig. 2 for D_n = 50 psf. Examining the tabulated values, it is apparent that β for the whole domain of variables does not change much, the range being from β = 4.20 to β = 4.91. [The safety index has also been examined for higher live-load intensities (75 psf and 100 psf). The minimum value for L_n = 75 psf is β = 5.10 and for L_n = 100 psf it is β = 5.77.]

High-Strength Bolts.—A relatively large amount of data concerning the strength characteristics of high-strength bolts are available. The results are scattered throughout a large number of references but these have been well summarized in a publication sponsored by the Research Council on Bolted and Riveted Structural Joints and this will be the principal reference cited in this section (5).

Direct Tension.—The mean resistance of a high-strength bolt in direct tension is

$$R_m = \left(\frac{\sigma_u}{F_u}\right)_m A_s F_u \qquad (10)$$

in which σ_u = the ultimate tensile strength of the bolts; F_u = the specified minimum tensile strength; and A_s = the tensile stress area of the bolt. The following data are available (5): $(\sigma_u/F_u)_m$ = 1.20 for A325 bolts and 1.07 for A490 bolts; V_{σ_u}/F_u = 0.07 for A325 bolts and 0.02 for A490 bolts.

It will be assumed that V_P = 0 (as for fillet welds) and that V_F = 0.05 (reflecting the good control characteristics of bolt manufacturing). In addition, the area of the bolt A_g, corresponding to the nominal diameter will be used. This is about 75% of the tensile stress area for bolt sizes commonly used in structural work. Using these data, for A325 bolts:

$$R_m = 0.90\,A_g F_u; \quad V_R = 0.09 \qquad (11a)$$

for A490 bolts: $R_m = 0.80\,A_g F_u; \quad V_R = 0.05$ (11b)

The term A_g can be obtained from the 1978 AISC Specification where $1.7(A_g F_t) = 1.7\,c\,(D_n + L_n)$ or

$$A_g = \frac{c}{F_t}(D_n + L_n) \qquad (12)$$

in which F_t = the allowable tensile stress as given in the Specification.

The resistance terms of Eq. 11 can now be written as, for A325 bolts:

$$\left.\begin{aligned} &R_m = 0.90\,\frac{F_u}{F_t}\,c\,(D_n + L_n) \\ &\text{for A490 bolts:}\quad R_m = 0.80\,\frac{F_u}{F_t}\,c\,(D_n + L_n) \end{aligned}\right\} \qquad (13)$$

In general terms, Eq. 13 can be expressed as

TABLE 2.—Safety Index β for High Strength Bolts and Fillet Welds

Dead load,* D_c, in pounds per square foot (1)	Tributary area, A_T, in square feet (2)	Safety Index, β						
		Fillet welds (3)	A325 bolts tension (4)	A490 bolts tension (5)	A325 bolts shear (6)	A490 bolts shear (7)	A325 bolts friction (8)	A490 bolts friction (9)
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	400	4.44	5.28	5.31	6.36	5.77	1.58	1.44
	575	4.33	5.19	5.23	6.30	5.70	1.46	1.32
	800	4.56	5.58	5.72	6.69	6.15	1.61	1.48
	1,000	4.70	5.83	6.03	6.95	6.43	1.71	1.58
75	200	4.53	5.50	5.62	6.61	6.05	1.59	1.46
	400	4.73	5.96	6.24	7.10	6.61	1.70	1.56
	720	4.50	5.71	6.00	6.88	6.39	1.47	1.33
	1,000	4.67	6.02	6.41	7.19	6.75	1.58	1.45
100	200	4.73	5.99	6.29	7.13	6.66	1.68	1.55
	400	4.91	6.41	6.89	7.57	7.17	1.78	1.64
	600	4.82	6.34	6.86	7.52	7.13	1.68	1.55
	750	4.68	6.15	6.65	7.35	6.94	1.56	1.42
	1,000	4.80	6.38	6.96	7.57	7.21	1.64	1.51

*Live load is 50 psf for all cases.

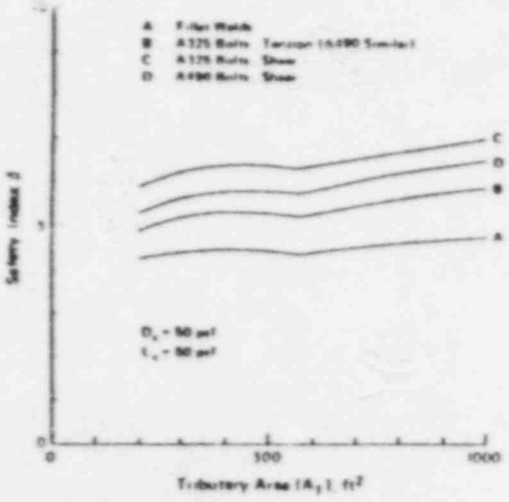

FIG. 2.—Safety Index for Various Connectors

for the safety index β (Eq. 3) can now be performed for a variety of dead and live-load intensities and for various values of the tributary area. Table 2 lists values of β for the basic code live-load value of L_c = 50 psf and for dead-load intensities of 50 psf, 75 psf, and 100 psf and for tributary areas ranging from 200 sq ft-1,000 sq ft. A plot of β versus tributary area is shown in Fig. 2 for D_c = 50 psf. Examining the tabulated values, it is apparent that β for the whole domain of variables does not change much, the range being from β = 4.20 to β = 4.91. [The safety index has also been examined for higher live-load intensities (75 psf and 100 psf). The minimum value for L_c = 75 psf is β = 5.10 and for L_c = 100 psf it is β = 5.77.]

High-Strength Bolts.—A relatively large amount of data concerning the strength characteristics of high-strength bolts are available. The results are scattered throughout a large number of references but these have been well summarized in a publication sponsored by the Research Council on Bolted and Riveted Structural Joints and this will be the principal reference cited in this section (5).

Direct Tension.—The mean resistance of a high-strength bolt in direct tension is

$$R_m = \left(\frac{\sigma_u}{F_u}\right)_m A_s F_u \qquad (10)$$

in which σ_u = the ultimate tensile strength of the bolts; F_u = the specified minimum tensile strength; and A_s = the tensile stress area of the bolt. The following data are available (5): $(\sigma_u/F_u)_m$ = 1.20 for A325 bolts and 1.07 for A490 bolts; V_{σ_u}/F_u = 0.07 for A325 bolts and 0.02 for A490 bolts.

It will be assumed that V_P = 0 (as for fillet welds) and that V_F = 0.05 (reflecting the good control characteristics of bolt manufacturing). In addition, the area of the bolt A_b, corresponding to the nominal diameter will be used. This is about 75% of the tensile stress area for bolt sizes commonly used in structural work. Using these data, for A325 bolts:

$$R_m = 0.90\, A_b F_u; \quad V_R = 0.09 \qquad (11a)$$

for A490 bolts: $R_m = 0.80\, A_b F_u; \quad V_R = 0.05$ (11b)

The term A_b can be obtained from the 1978 AISC Specification where $1.7(A_b F_t) = 1.7\, c\,(D_c + L_{rc})$ or

$$A_b = \frac{c}{F_t}(D_c + L_{rc}) \qquad (12)$$

in which F_t = the allowable tensile stress as given in the Specification.

The resistance terms of Eq. 11 can now be written as, for A325 bolts:

$$\left.\begin{aligned} &R_m = 0.90\,\frac{F_u}{F_t}\,c\,(D_c + L_{rc}) \\ &\text{for A490 bolts:}\quad R_m = 0.80\,\frac{F_u}{F_t}\,c\,(D_c + L_{rc}) \end{aligned}\right\} \qquad (13)$$

In general terms, Eq. 13 can be expressed as

$$R_m = \left(\frac{\sigma_u}{F_u}\right)_m \frac{A_s}{A_b}\frac{F_u}{F_t} c(D_c + L_{oc}) \qquad (14)$$

The safety index β (Eq. 3) can now be determined for high-strength bolts acting in tension. The values of Q_m and V_Q are defined in Ref. 11, while R_m is given by Eq. 13 or 14 and V_R by Eq. 11. The specified minimum tensile strength, F_u, for A325 bolts up to 1 in. in diameter is 120 ksi and 150 ksi for A490 bolts up to 1-1/2 in. in diameter. The allowable tensile stress, F_t, is 44 ksi for A325 bolts and 54 ksi for A490 bolts.

Table 2 lists the values of β determined for this case and they are also shown in Fig. 2 for the particular case of $D_c = L_c = 50$ psf. For A325 bolts, the safety index varies from 4.81 to 6.42 and for A490 bolts it ranges from 4.74 to 6.95.

Shear.—The mean resistance of a high-strength bolt acting under a force tending to shear it through a right cross section is

$$R_m = \left(\frac{\tau_u}{\sigma_u}\right)_m \left(\frac{\sigma_u}{F_u}\right)_m A_b F_u m \qquad (15)$$

in which τ_u = the shear strength; σ_u = the tensile strength of the bolt; F_u = the specified minimum tensile strength of the bolt material; m = the number of shear planes in the joint; and A_b = the cross-sectional area of the bolt. The statistical data available for the ratio of bolt shear strength to bolt tensile strength are (5): $(\tau_u/\sigma_u)_m = 0.625$ and $V_{\tau_u}/\sigma_u = 0.053$. These are applicable for both A325 and A490 bolts. The data to be used for the ratio of bolt tensile strength to specified minimum tensile strength are the same as given previously for bolts in tension and are different for the two grades of fasteners. Thus, for A325 bolts:

$$R_m = 0.625 \times 1.2\, A_b F_u m = 0.75\, A_b F_u m; \quad V_R = 0.10 \qquad (16a)$$

and for A490 bolts:

$$R_m = 0.625 \times 1.07 \times A_b F_u m = 0.67\, A_b F_u m; \quad V_R = 0.07 \qquad (16b)$$

In a fashion similar to the development of Eq. 12, the bolt shear area required by the 1978 AISC Specification can be developed as

$$A_b = \frac{c}{F_v m}(D_c + L_{oc}) \qquad (17)$$

in which F_v = the allowable shear stress given in the Specification. The resistance terms of Eq. 16 can now be written as, for A325 bolts:

$$\left.\begin{array}{l} R_m = 0.75 \dfrac{F_u}{F_v} c(D_c + L_{oc}) \\ \text{or for A490 bolts:} \quad R_m = 0.67 \dfrac{F_u}{F_v} c(D_c + L_{oc}) \end{array}\right\} \qquad (18)$$

In general terms, Eq. 18 can be expressed in the form

$$R_m = \left(\frac{\tau_u}{\sigma_u}\right)_m \left(\frac{\sigma_u}{F_u}\right)_m \left(\frac{F_u}{F_v}\right) c(D_c + L_{oc}) \qquad (19)$$

As noted for the case of high-strength bolts in tension, the specified minimum tensile strength will be taken as 120 ksi for A325 bolts and 150 ksi for A490 bolts. The permissible shear stresses according to the 1976 Research Council on Riveted and Bolted Structural Joints Specification and the 1978 AISC Specification are 30 ksi and 21 ksi for A325 bolts (no threads in a shear plane and threads intercepting a shear plane, respectively), with the corresponding figures of 40 ksi and 28 ksi for A490 bolts. The ratios of these shear stresses are approximately the same as the ratio between the gross bolt area and one taken through the root of the threaded portion of a bolt. Thus, the safety index, β, for the two cases will be nearly the same.

The values of β for high-strength bolts loaded in shear are given in Table 2 and are shown in Fig. 2 for the case of $D_c = L_{oc} = 50$ psf. Over the range examined, β varies from 5.86 to 7.58 for A325 bolts and from 5.23 to 7.21 for A490 bolts. It is worth noting that the safety index for high-strength bolts loaded in shear is significantly higher than that for fillet welds.

Friction.—High-strength bolts may be used in joints where it is desirable that slip not occur under the working loads. The contribution provided by one bolt to the total slip resistance is

$$P_s = m(k_s)_m (T_i)_m \qquad (20)$$

in which m = the number of slip planes, k_s is a slip coefficient reflecting the type and condition of the faying surface; and T_i = the clamping force provided by the bolt. A good deal of information is known about the slip coefficient and the clamping force and their distributions (5).

The mean value of the clamping force and its distribution depend upon the strength of the bolt and upon the method used for installation (calibrated wrench or turn-of-nut). In either method, the clamping force is to be a minimum of 0.70 times the specified minimum tensile strength of the bolt material, F_u, times the tensile area of the bolt, A_s. Using the data for bolts installed by the turn-of-nut method (5):

$$(T_i)_m = 1.20 \times 0.70\, F_u \times \frac{1.20}{1.03} A_s = 0.98\, A_s F_u \qquad (21)$$

in which 1.20/1.03 is the ratio of the mean tensile strength of all A325 bolts to the mean tensile strength of the particular lot of bolts used in these tests (both as compared to F_u). The coefficient of variation corresponding to Eq. 21 is 0.12 which is obtained by using 0.08 as the variation in the ratio of the actual clamping force to that specified (1.20), 0.07 as the variation in the ratio 1.20/1.03, and 0.05 as the assumed variation due to fabrication uncertainties.

For A490 bolts installed by the turn-of-nut method, the expression equivalent in meaning to Eq. 21 is (5)

$$(T_i)_m = 1.26 \times 0.70\, F_u \times \frac{1.07}{1.10} A_s = 0.86\, A_s F_u \qquad (22)$$

with a coefficient of variation equal to 0.10

The [illegible] coefficient obtained from a sample of 312 specimens of A7, A36, A440, and FE 37 and Fe 52 (European) steels is 0.336 with a coefficient of variation of 0.07 (5). Similar data are available for a number of other cases. For example, grit-blasted A514 steel has a slip coefficient of 0.331 with a coefficient of variation of 0.04.

The value of the slip resistance expressed by Eq. 20 can now be further quantified. Considering bolts installed by the turn-of-nut method and steels such as A36 with clean mill scale, for A325 bolts:

$$P_s = 0.33\, m A_s F_u ; \quad V_R = 0.24 \qquad (23a)$$

and for A490 bolts: $P_s = 0.29\, m A_s F_u ; \quad V_R = 0.24$ (23b)

The 1978 AISC Specification presents the requirements for friction-type connections in terms of an allowable shear stress (even though the bolts are not actually acting in shear).

$$F_v A_b m = c\,(D_n + L_n) \qquad (24)$$

Solving for m and using a value of 0.75 for the ratio of tensile stress area to gross bolt area, A_s/A_b, the strength terms in Eq. 23 become, for A325 bolts:

$$\left.\begin{aligned} &P_s = 0.25\,\frac{F_u}{F_v}\,c\,(D_n + L_n) \\ &\text{or for A490 bolts:}\quad P_s = 0.22\,\frac{F_u}{F_v}\,c\,(D_n + L_n) \end{aligned}\right\} \qquad (25)$$

In general terms, Eq. 25 can be written as

$$P_s = (k_s)_m (T_i)_m \frac{A_s}{A_b}\frac{F_u}{F_v}\,c\,(D_n + L_n) \qquad (26)$$

The specified minimum tensile strengths, F_u, are again 120 ksi, for A325 bolts and 150 ksi for A490 bolts. The values given by the AISC Specification for F_v are 17.5 ksi for A325 bolts and 22 ksi for A490 bolts. The values of the safety index, β, for joints of A36 (or similar) steel with clean mill scale faying surfaces and using either A325 or A490 bolts installed by the turn-of-nut method are tabulated in Table 2. A plot of values for the case of $D_n = L_n = 50$ psf is shown in Fig. 2. Over the range examined, the safety index varies from 1.46 to 1.78 for A325 bolts and from 1.32 to 1.64 for A490 bolts.

As expected, the values of the safety index are low for bolted, friction-type connections as compared to the other cases considered. This is because the consequences of failure of a friction-type bolted connection are less severe than the failure of high-strength bolts in shear or tension or of fillet welds in shear. A separate value of the safety index should be established for each of the serviceability limit states (bolts in friction-type connections) and strength limit states (bolts in tension or shear and fillet welds).

The value of β = 4.5 will be selected for the strength limit state. This reflects quite accurately the values obtained for fillet welds, except for some cases of high live- to dead-load ratios, and will be conservative for high-strength bolts. It would be in order to select two different values of β for these two cases, fillet welds and high-strength bolts. Although it would be more economical in terms of material used, two values of β would increase the design complexity.

For the serviceability state, β = 1.5 will be used. Based on the cases examined, this represents a reasonable value.

Determination of Resistance Factor

The resistance factor, φ (Eq. 1), can be expressed as (11)

$$\phi = \frac{R_m}{R_n}\exp(-\alpha\,\beta\,V_R) \qquad (27)$$

in which R_m = the mean resistance; R_n = the nominal resistance as expressed by the design criteria; and α is a numerical factor equal to 0.55 (11). The terms β and V_R have been defined previously. The sections following will establish the values of the resistance factor for the various fastener conditions.

Fillet Welds.—The nominal resistance of a fillet weld in shear is customarily taken as 0.6 times the specified minimum tensile strength of the deposited weld metal. This is based on an assumption that the fillet weld is in pure shear and that the distortion energy theory describes the condition of plastic flow. (The "exact" number is $1/\sqrt{3}$ or 0.577.) Calling the throat area of the weld, A_w, the nominal resistance is then

$$R_n = 0.6\,F_{EXX} A_w \qquad (28)$$

The mean resistance of the weld is

$$R_m = A_w (\tau_u)_m \qquad (29)$$

As described in the development of the safety index for fillet welds, β = 4.5, $(\tau_u)_m = 0.88\,F_{EXX}$, and $V_R = 0.19$. Substitution of these values and the expressions given by Eqs. 28 and 29 into the expression for the resistance factor (Eq. 27) gives a value φ = 0.93.

High-Strength Bolts: Tension.—The nominal resistance of a high-strength bolt in tension is (5)

$$R_n = A_s F_u \qquad (30)$$

and the mean resistance, as given earlier, is $R_m = 1.20\,A_s F_u$ for A325 bolts and $R_m = 1.07\,A_s F_u$ for A490 bolts. For these two fasteners, it was found that $V_R = 0.09$ for A325 bolts and $V_R = 0.05$ for A490 bolts. Again using β = 4.5, it can be determined from Eq. 27 that φ = 0.97 for A325 bolts in tension and φ = 0.94 for A490 bolts in tension.

High-Strength Bolts: Shear.—The nominal resistance of a high-strength bolt in shear is (5)

$$R_n = 0.625\,A_b F_u \qquad (31)$$

and the mean resistance, as developed in Eq. 16, is $R_m = 0.75\,A_b F_u m$ for A325 bolts and $R_m = 0.67\,A_b F_u m$ for A490 bolts. The values of V_R were found to be 0.10 for A325 bolts and 0.07 for A490 bolts. Using a value of β = 4.5, the resistance factor (Eq. 27) is φ = 0.94 for A325 bolts and φ = 0.89 for A490 bolts.

High-Strength Bolts: Combined Shear and Tension.—For a fastener subjected to both tension and shear, the following relationship has been recommended (5):

$$S^2 + (0.6T)^2 = \phi(0.6 A_b F_u)^2 \qquad (32)$$

in which S is the factored shear force, T is the factored tensile force, and A_b represents either the bolt area through the shank or through the root of the threads, depending upon the actual location of the failure surface.

The resistance factor, ϕ, can be established from

$$\frac{R_m}{R_n} = \left(\frac{R_{exp}}{R_n}\right)_m \left(\frac{\tau_u}{F_u}\right)_m \qquad (33)$$

and $$V_R^2 = \frac{V^2_{R_{exp}}}{R_n} + \frac{V^2_{\tau_u}}{F_u} + V_P^2 + V_F^2 \qquad (34)$$

in which R_{exp}/R_n is the ratio of the experimental strength to the nominal strength according to the interaction equation (Eq. 32 with $\phi = 1.0$). The statistical data for the ratio are $(R_{exp}/R_n)_m = 1.05$ and $V_{R_{exp}}/R_n = 0.10$. Using these data and the previously developed information, $V_P = 0$, $V_F = 0.05$, $(\tau_u/F_u)_m = 1.20$ or 1.07 for A325 or A490 bolts, and $(V_{\tau_u}/F_u) = 0.07$ or 0.02 for A325 or A490 bolts, ϕ can be determined using Eq. 27 as 0.91 for A325 bolts and 0.85 for A490 bolts.

High-Strength Bolts: Friction.—The nominal frictional resistance provided by the clamping action of one high-strength bolt is

$$R_n = m\, k_s (A_s \times 0.7 F_u) \qquad (35)$$

and the mean resistances and coefficients of variation are as given by Eq. 23. The value of V_R was found to be 0.24 for both fasteners. Using these data and the value $\beta = 1.5$, the resistance factor is found from Eq. 27 to be $\phi = 1.15$ for A325 bolts and $\phi = 1.01$ for A490 bolts. In both cases, it has been assumed that the bolts are installed by the turn-of-nut method and that the faying surfaces are in the clean mill scale condition.

Modified Resistance Factor.—The use of two different values of the safety index ($\beta = 3$ for members and $\beta = 4.5$ or 1.5 for fasteners) introduces some operational difficulties that must be resolved. Writing Eq. 2 in terms of the dead- and live-load intensities, D_m and L_m:

$$\phi R_n \ge \gamma_E (c_D \gamma_D D_m + c_L \gamma_L L_m) \qquad (36)$$

in which γ_E = the load factor representing uncertainties in the analysis. From Ref. 11:

$$\gamma_E = \exp(\alpha \beta V_E) \qquad (37)$$

$$\gamma_D = 1 + \alpha \beta \sqrt{V_A^2 + V_D^2} \qquad (38)$$

$$\gamma_L = 1 + \alpha \beta \sqrt{V_B^2 + V_L^2} \qquad (39)$$

Using the values $V_A = 0.04$, $V_D = 0.04$, $V_B = 0.20$, $V_L = 0.13$, and $V_E = 0.05$ (Ref. 5), the load factors γ can be established for the three values of β. These are tabulated in Table 3.

For beams, columns, and other main structural components (β = ,. the use of $\gamma_E = 1.1$, $\gamma_D = 1.1$, and $\gamma_L = 1.4$ has been recommended for use in the LRFD format (11). While $\gamma_E = \gamma_D = 1.1$ would still be appropriate for both categories of fasteners, a value of $\gamma_L = 1.2$ should probably be chosen for fasteners in friction-type connections and $\gamma_L = 1.6$ should be used for all other fasteners. However, rather than using different load factors for these cases, the effect of the different β factors can be imposed on the value of ϕ to be used. For the category described in Table 3 as "Connections—All Others," this means that

$$\phi R_n \frac{1.09(1.09\, c_D D_m + 1.39\, c_L L_m)}{1.13(1.14\, c_D D_m + 1.59\, c_L L_m)} \ge 1.1(1.1\, c_D D_m + 1.4\, c_L D_L) \qquad (40)$$

The ratio on the left-hand side of this inequality varies only from 0.86 to 0.90 as the live-load to dead-load effect ($c_L L_m / c_D D_m$) goes from 2 to 0.25. The corresponding variation for the category "Connections—Friction" is from 1.18 to 1.12 over the same range. Since the variation is not large in either case, it is recommended that the resistance factor, ϕ, be modified for connections as follows: $\dot{\phi} = 0.88\,\phi$ when $\beta = 4.5$ and $\dot{\phi} = 1.15\,\phi$ when $\beta = 1.5$.

TABLE 3.—Load Factors for Various Safety Index Values

Safety index (1)	Load Factors γ_E (2)	 γ_D (3)	 γ_L (4)
β = 3.0 (members)	1.09	1.09	1.39
β = 1.5 (connections—friction)	1.04	1.05	1.20
β = 4.5 (connections—all others)	1.13	1.14	1.59

The modified resistance factors for the various cases considered are therefore, for fillet welds: $\dot{\phi} = 0.88 \times 0.93 = 0.82$. For high-strength bolts:

1. Tension: A325 $\dot{\phi} = 0.88 \times 0.97 = 0.85$ and A490 $\dot{\phi} = 0.88 \times 0.94 = 0.83$.
2. Shear: A325 $\dot{\phi} = 0.88 \times 0.94 = 0.83$ and A490 $\dot{\phi} = 0.88 \times 0.89 = 0.78$.
3. Tension and shear: A325 $\dot{\phi} = 0.88 \times 0.91 = 0.80$ and A490 $\dot{\phi} = 0.88 \times 0.85 = 0.75$.
4. Friction joints: A325 $\dot{\phi} = 1.15 \times 1.15 = 1.32$ and A490 $\dot{\phi} = 1.15 \times 1.01 = 1.16$.

Clearly, it is desirable to reduce the number of values to be used for the resistance factor to a minimum. It is recommended that $\phi = 0.80$ be used for all cases involving the strength limit state, i.e., fillet welds, and high-strength bolts in tension, shear, or combined tension and shear and that $\phi = 1.15$ be used for the serviceability limit state, i.e., slip-resistant joints using high strength bolts. The value selected for the strength limit state is somewhat unconservative for A490 high-strength bolts in shear and for A490 bolts in combined tension and shear. It should be recalled, however, that the value of the safety index

$\beta = 4.5$ as conservative for all cases involving high-strength bolts. The value $\phi = 1.15$ selected for the serviceability limit state is conservative, reflecting the fact that bolts will not always be installed by the turn-of-nut method.

RELATED CONNECTOR PROBLEMS

Slip-Resistance Connections: Check for Strength.—When it is considered necessary that connected parts not slip into bearing under service loads, the connection will be designed as a friction-type joint using the criteria already developed for that case. It must be recognized, however, that such a design does not automatically ensure that the criteria established for a bearing-type connection will also be met. Therefore, if the serviceability limit state (slip) is being examined, the strength limit state (both shear strength and bearing capacity) must also be checked.

Ordinary Bolts.—It has been customary in the past to apply the same design rules to ordinary bolts [American Society for Testing and Materials (ASTM) A307] as those specified for high-strength bolts (ASTM A325 and A490). Very little data about the strength of ordinary bolts are available and it is therefore recommended that the same procedure be followed, i.e., the LRFD procedures developed for high-strength bolts be considered valid also for ordinary bolts. Of course, ordinary bolts should not be prescribed for friction-type connections since the level of their clamping force is both uncertain as to magnitude and probably highly variable.

Bolts—Bearing Capacity of Connected Material.—The bearing capacity of the connected material immediately adjacent to a bolt is a design problem usually associated with the fastener. Strictly speaking, it should be assigned to the member but it will continue here to be related to the fastener.

The nominal resistance in bearing has been established as (5)

$$R_n = e\,t\,F_u \leq 3\,t\,d\,F_u \qquad (41)$$

in which F_u = the specified minimum tensile strength of the plate material; d = the bolt diameter; e = the end distance of the bolt; and t = the governing plate thickness (the thinner of the two thicknesses in a lap joint or the least of the sum of the thicknesses of the two outer plies or the thickness of the enclosed ply in a butt joint). Eq. 41 is applicable as long as e/d is not less than 1.5.

The following statistical data relate to Eq. 41 (5): Number of tests = 27; ratio of mean test to predicted values = 0.99; and coefficient of variation = 0.11. With respect to F_u, the following data are available (11): Ratio of mean to specified ultimate tensile strength = 1.10 and coefficient of variation = 0.11. From these data, $V_R = 0.16$. Using Eq. 27 and the value $\beta = 4.5$, $\phi = 0.99 \times 1.10 \exp(-0.55 \times 4.5 \times 0.16) = 0.73$.

Modifying this to account for the use of the higher safety index, $\phi = 0.88 \times 0.73 = 0.64$.

SUMMARY AND CONCLUSIONS

This paper develops the nominal resistance term and resistance factor for each of the commonly used connectors in structural steel. The statistical information necessary for the development is also presented. The work shows that current design values for different connectors provide substantially different levels of reliability.

ACKNOWLEDGMENTS

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The increased use of high-strength steels and the need to refer to them in specification provisions resulted in further studies on fillet welded connections.[19.4] Since fillet welds may be made with electrodes whose mechanical properties are not equal to those of the base metal, the study evaluated the influence of type of electrode, size of fillet weld, type of steel, and type of weld. All test specimens were designed to fail in the welds, even though the mechanical properties of the weld metal exceeded those of the base metal.

The study indicated that when longitudinal fillet welds were made with electrodes that "matched" the connected steel, the weld strength varied from 60 to 85 per cent of the electrode tensile strength as illustrated in Fig. 19.3. The study indicated that the failure plane generally was at an angle less than 45° to the plane of a leg. Thus, use of the minimum throat thickness is conservative.

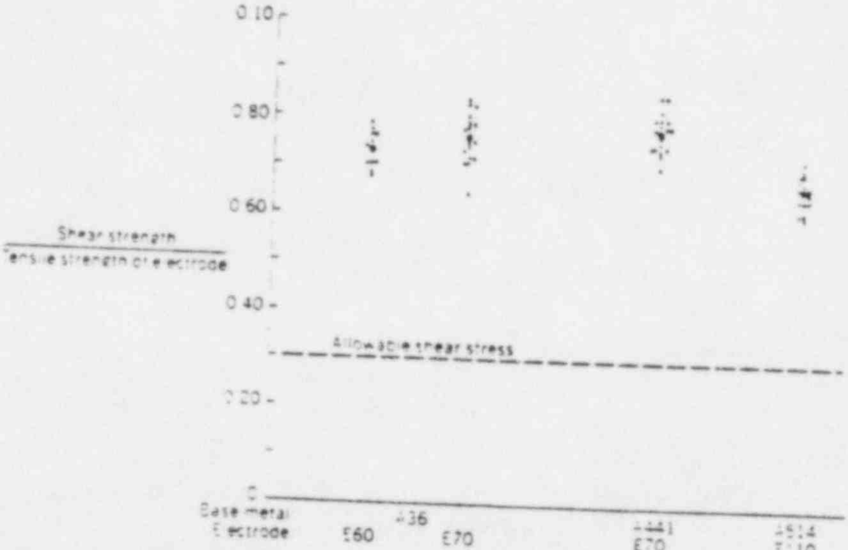

Fig. 19.3 Shear strength of longitudinal fillet welds with matched base metal.

Since weld metal may be deposited on base metal with different mechanical properties, combinations of strong base metal with weaker weld metals and vice-versa were also evaluated.[19.4] The results are summarized in Fig. 19.4. This revealed that the effect of dilution upon weld strength was not great.

Where plate bending is not a problem, tests of welds subjected to combined bending and shear have indicated a varying factor of safety against weld failure. The results of tests on vertical weld groups are plotted in Fig. 19.5. As the ratio of eccentricity to weld length (e/L) varies from 0.06 to 2.4, the

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Subject: Weld Evaluations

Problems associated with welding are now causing unnecessary cost increases and delays at a number of nuclear sites. The subject of this paper primarily deals with the inspection of welds. The observations given are based on construction activities being performed at a number of nuclear sites and are not related to any one particular site.

The subject welding is under the auspices of both the American Welding Society (AWS) for structural welding and the ASME Code (Section III) for welding of pressure components and associated supports. The areas of concern are fourfold:

1. Continuous measurement of fillet welds;
2. Grinding of all fillet and butt welds;
3. Undercut provisions of AWS D1.1; and,
4. Encroachment on minimum thickness.

I will address these areas individually.

I. CONTINUOUS MEASUREMENT OF FILLET WELDS

Both AWS D1.1 and the ASME Boiler and Pressure Vessel Code have requirements for minimum sized fillet welds which have been in existence for many years. During these many years, (at least until three or four years ago), Inspectors adequately evaluated fillet welds without 100% physical measurement of each inch of welding.

Several years ago this changed when a supplier furnished free fillet weld gages to QA/QC Inspectors at several nuclear plant sites. The result was that some Inspectors stated measuring each inch of fillet weld to verify that the specified minimum weld size was met for the continuous length of weld. What had previously been correctly understood by Inspectors to be a visual judgment was suddenly unacceptable to some Inspectors. Not surprisingly, slightly undersized welds were found in minor local areas, and many Non-Conformance Reports were written. If the Designer reviewed and accepted these local conditions as adequate, the Inspector might object on the basis that the specified minimum sizes were not met. If the Inspector's supervisor or other experienced Inspectors said the discrepancies were acceptable, some Inspectors stated they were being harassed or intimidated.

This condition has recently progressed to a more serious extreme when NRC Inspectors examined about one thousand (1,000) fillet welds and found only <u>one</u> that was undersized. The particular weld (1/2 inch fillet) was only four inches long and was only 1/32 inch undersize. The weld was initially considered by the NRC as a major discrepancy, and after further consideration was re-evaluated as minor. Good judgment would have indicated no problem existed.

Because QA/QC Inspectors do not want the NRC to find any undersize welds, the tendency now is for them to initiate reinspection programs. This is extremely time consuming, costly and does not add to overall plant safety. Inspectors have told me they intend to assure all welds are "perfect". Of course, perfection is physically impossible, but in looking for perfection in weld size, the Inspectors could miss some of the other more critical aspects they should be evaluating, with the result that inadequate inspections will be performed.

One acceptable way for an experienced, qualified Inspector to evaluate fillet welds is as follows:

- Review the weld procedure.
- Review and evaluate the welder's performance.
- Based on this information, determine the number of weld passes required to achieve the required weld size specified on the appropriate drawings.
- Visually examine the weld pattern and then, on the basis of sample measurements, determine the adequacy of the weld deposit.

There is no requirement either in the ASME Section III Code or the AWS D1.1 Standard to continuously measure the full length of fillet welds. Both ASME and AWS permit deviations from minimum size fillets as documented in ASME NB-4427 (and NC/ND-4427) and paragraphs 8.15.1.7 and 9.25.1.7 of AWS D1.1. In fact, there is no requirement in any structural or ASME Code to continuously measure for minimum dimensions of any material. Thickness checks are not required to be performe ~~for~~ each inch of surface of a nuclear reactor, for each inc of surface of structural beams, or for minimum wall thick ness of pressure piping.

There are minor imperfections in every man-made object built Because of this, the ASME Code imposes a safety factor of . or 3 depending on the design and intended use of the item. These safety factors are provided to account for unknowns and minor imperfections. Therefore, inspections can be made on a random sample basis to determine nominal sizes with no detriment to safety.

It can be conservatively estimated that the cost of reinspections, unnecessary repairs, increased documentation, and unwarranted delays can cost close to $100 million per site.

There are usually five or six (a minimum of three) levels of inspection on nuclear components. When the NRC (as the last level of review) is critical of minutiae, all the preceding levels of inspection become more demanding and consequently require more repairs to be made. When inspections of fillet welds are placed in their proper perspective, the true areas of concern can be more easily evaluated. In addition, excessive repair welds often tend to harm rather than help the structures. It is known that some repair welds have been the cause of cracking problems.

II. GRINDING OF ALL FILLET AND BUTT WELDS

There seems to be an unnecessary practice developing in the industry which requires that fillet and butt welds should be ground to eliminate all ripples or to make flush surfaces. This is not a requirement of either AWS D1.1 or ASME Section III. NB-4424 (and NX-4424) of Section III specifically states that "as-welded" conditions are permitted as long as any possible defects, as shown by non-destructive examinations, are not masked. Section III prohibits coarse ripples which would mask defects, but does not prohibit all ripples. Many Inspectors are insisting that welds be ground to eliminate even ordinary ripples which do not have any adverse effect on weld quality.

Insistence on grinding welds could result in other potential safety concerns. Specifically, it can result in overgrinding and unnecessary repair welds. It also makes it difficult to locate butt welds at a later time, such as during in-service inspection.

The "as-welded" condition has no impact on safety (provided the ripples do not mask the detection of unacceptable defects) but grinding welds significantly increases the cost of the plant. In addition, the grinding itself may cause other safety problems.

III. UNDERCUT PROVISIONS OF AWS D1.1

The third problem regarding welding pertains to weld undercut. Early editions of AWS D1.1 prohibited undercut and the current issue has a restriction on the depth of undercut which is based on the direction of the principal stress in the welded member. These rules are impossible to follow, because undercut can not be eliminated completely and the Inspectors do not know the direction of primary stress when performing inspections. The problem caused by these provisions have been discussed with members of AWS D1.1 technical staff, but these men are reluctant to revise the document because there have been no major industry complaints. This reluctance only means that the provisions of the document are not enforced, or as permitted by AWS D1.1, the provisions are waived by the designers. The minimum weld undercut allowed by AWS D1.1 (0.01 inch) cannot be measured, so the restriction is ridiculous.

Section III, NB-4424(c), allows 1/32 inch undercut. Designers have not had a problem with this provision, and the Inspectors have been able to make adequate evaluations based on this provision.

A problem arises when NRC Inspectors become overly strict and insist on no undercut at all. Some Inspectors have rejected ASME structural welds on the basis of the old AWS D1.1 requirements which were written primarily for bridges and buildings. One NRC Inspector rejected a weld undercut because it was 1/64 inch deeper than permitted by Code. This leads to more weld repairs which is a safety concern.

IV. ENCROACHMENT ON MINIMUM THICKNESS

There are cases where Inspectors have noted that minimum thickness requirements may not be met for local areas of the items being inspected. These local thin areas may be caused either by undercut or grinding. The resultant weld repairs to restore minimum thickness can cause more problems than accepting the area on the basis of engineering evaluation.

The ASME Code philosophy of design allows local discontinuities. The design engineer can often justify the shallow spots by showing that the local area involved is less in diameter than the Code allowed diameter of an unreinforced opening. Also, the ASME Code allows areas around discontinuities to have an increased primary stress of up to 110% of the allowable stress. When the design engineer uses these evaluations to accept local conditions, the Code require ments are met and unnecessary weld repairs are avoide Unfortunately, some Inspectors refuse to accept these condi tions, even when the ASME Authorized Nuclear Inspectors hav approved the engineering resolution.

In the preceding areas of welding concern, there is no safet problem, except for the repair welding which is caused when emphasis is placed on the wrong criteria. The NRC is involved becaus some NRC Inspectors and Investigators are not allowing good judgment to be exercised.

In general, the ASME Authorized Nuclear Inspectors (ANI) have understood and properly controlled weld inspections. However, when NRC investigators criticize the condition of welds already accepted by the ANI, the criticism forces the ANI to reject welds which he previously knew to be acceptable.

This welding inspection problem is significant enough that more guidance should be given to NRC Inspectors and industry regarding the acceptance criteria and methods of inspecting welds. The cost, in both time and money, for continuing to inspect for minutiae is unacceptable. The industry needs an inspection program appropriate for determining significant problems and assuring adequacy. Concentrating on assuring adequacy will allow for more meaningful inspections and substantially reduce unnecessary weld repairs.

SUGGESTIONS

- Meetings and Seminars with both industry and NRC participation;
- Technical papers on the subject by prominent industry and NRC personnel;
- Training courses on use and understanding of Codes and Standards;
- NRC support for clarifying Codes and Standards to allow "qualified" professional engineers to make engineering judgments. (Endorse ASME/ANSI N626.3 for "qualification".)
- NRC Information Notices;
- Schedule NRC-Industry Forums to discuss other problems as identified by either group.

R F Leedy

ASSESSMENT OF DIC PROGRAM

SECTION I

A In relation to Quality Program breakdown in DIC AWS D.1.1 Welding KG&E has conducted an assessment of the programmatic aspects of the piping, hanger, mechanical, electrical and civil disciplines to ascertain adequacy of the programs instituted.

The assessment has concluded that a satisfactory level of confidence exist to assure compliance to 10CFR50, ANSI N45.2, FSAR, Design and Procedural Requirements.

The following general aspects of the Construction Program at Wolf Creek Generating Station provide adequate assurance of the completeness of the program and its implementation.

1. Activities are controlled by written construction procedures (Administration, Work and Quality). These procedures are developed to provide a method to document and implement work to comply with FSAR commitments, including applicable requirements of the specifications, codes, and standards and include appropriate requirements of 10CFR50 and ANSI N45.2. These procedures are revised as necessary to provide program enhancements and all procedures/revisions are reviewed by DIC Construction Engineering, Quality Engineering, Quality Assurance, Quality Inspection, KG&E Construction and Quality Assurance Organizations. Redundancy of the review serves to identify possible errors or omissions, and discontinuities would be identified and resolved, prior to implementation.

2. A major program enhancement review was conducted by DIC in early 1982. This program was initiated to provide a critical review and identify areas in which the Program could be improved to assure completeness and provide for effective implementation. As a result, new procedures were developed and many procedures were extensively revised to achieve improved control of ongoing construction activities. For those areas containing ineffective or incorrect program controls, an evaluation of past performance was conducted and corrective action taken as necessary.

3. All work and inspection activities are routinely audited by both DIC and KG&E QA organizations. The Authorized Nuclear Inspector for ASME Code Applications provides supplemental surveillances. Periodic audits are also provided by DIC corporate personnel, NRC and ASME auditors. Again, redundant auditing programs provide added assurance of implemention of the Construction Program.

   In addition to these audits and surveillances various external auditing agencies such as INPO, and Construction Self Appraisal (CSA),have conducted extensive Program evaluations to determine the effectiveness of the Program and its implementation.

In addition to the above, sections II, III and IV also illustrate and emphasize the Quality Programs of the project and to provide confidence in the construction effort.

Section II

The below listed areas of discipline depict the enhancements that have been performed over the life of the project to assure construction acceptability and program commitment acceptability.

A Pipe, Hanger, Mechanical Disciplines

The DIC Programs established for ASME, ANSI B31.1 Critical and Special Scope piping and hangers provide assurance of their adequacy as follows:

1. Traveler packages are issued prior to work activities. Prior to release, travelers are reviewed and approved by both Construction Engineering and Quality Engineering to assure that all work and documentation requirements are included and adequately addressed.

2. Quality Hold Points are established in the traveler documentation precluding work to process beyond designated Quality inspection/verifications.

3. Documents included in the traveler are entered on an index to assure that documentation is not lost or removed from the traveler without adequate control.

4. Traveler packages are in the work areas to assure ongoing work activities are conducted in accordance with established work assignments.

5. Traveler package documentation undergoes an in-depth final review by Engineering prior to transmittal to the Combined Review Group (CRG) for final review.

Various program inadequacies have been identified, addressed, and resolved through audits, nonconformance reports, Stop Work Actions, or Corrective Action Reports, which provides additional assurance of program adequacy.

B Electrical Discipline

The Electrical discipline was evaluated to determine programmatic adequacy and controls established to assure compliance with requirements. Following is a synopsis of the evaluation:

1. All electrical installations are performed by the direction of a work assignment issued by engineering. The work assignment is issued to perform any required work to support a system or building turnover. The system or building scope is used by Construction, Quality, CRG and Startup to assure that all work necessary for the system is completed.

   The scope of the system or building includes the cables, terminations, equipment, raceways and supports required for the operation of the system or building per the current approved design. Engineering initiates the appropriate work assignments for implementation of the work in accordance with the applicable procedures.

The work assignment specifically identifying the work to be performed is issued to the craft for implementation with a copy being issued to Quality Inspection for verification and documentation of the installation. After completion of the work, Quality Inspection transmits the Quality checklists and supporting documention to CRG for final review.

2. In July of 1981 DIC discovered concerns relative to the inspection and documention of the anchor bolts installed for electrical supports in Class IE areas. The concern was addressed to Bechtel via NCR 1SN 3476 C for an A/E evaluation to determine an alternate means of verifying the integrity of the installed anchors. Bechtel was able to formulate an alternate means of verifying the anchor bolts integrity by supplying alternate torque values for specific details used for electrical supports. With this alternate means of verifying the anchor installation DIC was able to accept the anchor installation without removing the installed support.

3. In August of 1982 DIC encountered problems concerning the available documentation and missing documentation for the welds of electrical supports installed prior to August of 1982. After identification of the problem via NCR 1SN 20073 EW, DIC revised its work and quality procedures to require inspection/reinspection of all raceway supports in Class IE buildings and Class IE supports in non-class IE buildings to assure that all the necessary inspections had been performed. After the implementation of the new procedures, Bechtel was requested to perform an independent survey to determine the acceptability of the welds for II/I supports installed prior to August 12, 1982. Based on the results of Bechtel's survey, it was concluded that welds for II/I supports installed prior to August 12, 1982 no longer require inspection. Their engineering evaluation resulted in adequate confidence in the installed welds to allow for the deletion of weld inspection. The inspection requirements for Class IE supports was not involved in the survey and continues to require a complete weld inspection. This program, at the present time, is 99% complete.

4. DIC suspended low voltage cable testing and terminations on March 18, 1983 for failure to comply with IEEE-422-1977 and was documented by NCR 1SN-9486-E at the request of Electrical Engineering. As a result of this NCR, DIC terminations engineers, craft and quality inspectors were retrained as to the intent of IEEE-422-1977. Extensive research was performed to identify and document all cables as to the validity of the tests performed. This resulted in two additional NCRs (1SN 12484-E and 1SN 13893-E) and procedural revisions to establish more stringent test controls.

5. DIC Electrical, in May of 1983, identified concerns via NCR 1SN 11287-E relative to the material installed for special scope II/I electrical supports. It had been found that special scope II/I electrical supports were installed using non-traceable, non "Q" material. In close coordination with KG&E and the Design A/E, extensive field inspections and research was performed to provide the A/E with sufficient information to allow them to perform an engineering evaluation and determine if the subject material can be used as installed.

The A/E's evaluation resulted in a "USE AS IS" disposition.

In addition, DIC revised its work and quality procedures to provide sufficient material control and verification to assure the installation of qualified support material.

6. In April of 1984 DIC electrical discovered concerns relative to the breakdown of the unique identification requirements for electrical supports. DIC Electrical initiated CAR 1-E-0039 to document these concerns. Extensive research and corrective action was implemented to correct and resolve these items. Implementation of the resolutions for CAR 1-E-0039 has been completed.

7. In April of 1984, DIC identified a generic concern on the method/accuracy of maximum allowable sidewall pressure (MASP) permitted during the cable pulling process. This was addressed on NCR 1SN 17440E for resolution. The A/E's evaluation resulted in a "USE AS IS" disposition.

8. In the process of performing final inspection on raceway, a deviation form the "1" separation criteria was identified on KG&E CAR-15. This item was documented on NCR 1SN-20443-E and dispositioned in compliance with the applicable procedures. Work is presently being implemented to bring this into compliance.

In addition to Daniels performing the installations to their approved procedures additional credibility is added to this by acceptable start-up and pre-operational testing performed by the KG&E organization.

C Civil Discipline

The Civil Discipline was evaluated in the major areas of Civil activities to determine the adequacy of the program and established controls. The following is a synopsis of the evaluation by area:

1. Concrete and Materials Testing

The possibility of the use of defective materials is minimized by a system of testing, at specified intervals, to assure acceptability. Test frequencies are maintain through the use of logs, as for raw materials and designated "test loads", as for concrete placements. Deficient materials/products have been identified and resolved through the Nonconformance Program.

2. Steel Coatings

Steel Coating activities began at Wolf Creek without the Daniel procedure WP-V-100 being approved by KG&E. As a result, a third party evaluation was performed. Results provided conclusive evidence of satisfactory performance and acceptance by Bechtel and the NRC. Inspection programs have assured that acceptable, certified materials were utilized in each approved coatings technique. Inspection release is also required prior to application of subsequent layers of coating materials. External audits have failed to detect any adverse trends in this area.

3. Concrete and Grout Placements

Concrete and Grout Pre-Placement checklists are utilized by Quality to assure all prerequisites are completed prior to placement. Locations of embeds and installed material are verified and documented. Concrete and Grout Placement Cards are utilized to assure interface of various craft and Quality disciplines prior to release for placement activities. These documents become part of the pour package, are reviewed by CRG and are retained as a QA record.

4. Cadwelding/Rebar

Placement and acceptability of placement of rebar and cadwelds is controlled through the use of marked-up as-built drawings. Cadwelds are produced by certified craftsmen whose qualifications are verified by Quality prior to cadwelding. Cadweld recertification is performed at intervals controlled through logs maintained by the Foremen and Quality inspectors.

Assurance of acceptable rebar and cadweld placement is also verified prior to concrete placement through completion of the Concrete Pre-Placement checklist.

5. Soils

The soils program also shows problem preventive mechanisms in the form of placement prerequisites and logs. Before fill may be placed, the foundation must be approved by the Geotechnical Engineer and that approval must be verified by QC. At this point the QCI initiates a log (Lift Thickness Log/Daily Inspection Report) as a means to track compaction/moisture test frequencies. With controls as described, improper placement and inspection are minimized. Errors are readily evident during review of logs.

6. Core Drilled Penetrations

Location, elevation, and size are verified by Quality. Cut rebar in the penetrations are noted and documentation filed by the applicable concrete placement number. Cut rebar in specific concrete placements is tracked by Civil Engineering to preclude nonconformance. All core drilling has been performed by one crew throughout the power block and would assure consistency of results. No significant discrepancies have been identified in this area. Piping placement and sealing operations also require verification of penetration location and acceptability.

7. Post Applied Plates/Expansion Anchors

Procedures and Quality checklists provide hold points which preclude nonconforming installations. Verifications include bolt length and size, concrete surface and surrounding area, size of plate, bolt pattern, location of installation, and bolt torque. Location acceptability is further verified when attachment to plates is performed by other disciplines. Acceptability of expansion anchors is performed solely by Civil Quality to assure uniform knowledge criteria. Several program audits have been performed on this activity resulting in program enhancements and a retrofit of electrical installations per NCR 1SN 3476C.

At KG&E's request an investigation was initiated by DIC to determine the retrievability of installation documentation associated with post applied plates. KG&E provided a statistical sampling plan based on Mil-Std 105D, which established the sample size and AQL to determine acceptability of the total population. The results of the investigation were well within the established acceptability level.

8. Structural Steel Bolting

Drawings are used by Quality personnel in efforts to status their inspection and acceptance. As connections are inspected and accepted a drawing is highlighted, initialed and dated by the inspector. When all connections per an evaluation are finished an Erection Checklist is completed for that elevation. The drawing is attached and retained as a QA record.

In addition, connections that are disassembled subsequent to inspection must be brought to the attention of QC via written notification. At that time QC maintain status of the joint. The written notification is placed in a suspense file and/or the drawing is annotated accordingly. Both are used as quick reference before turning over documentation to Document Control. Structural steel bolting has been further addressed on DIC CAR 1-C-0026.

9. Structural Steel Welding

The completion of acceptable retraining on April 1, 1981 emphasized to all welding inspectors, including those inspecting AWS welds, the importance of assuring welds satisfy established acceptance criteria. A 100% weld reinspection was initiated at this time on ASME, B31.1, Critical, Special Scope Component Supports. However, structural steel welds were not included in this reinspection effort and were subsequently addressed on DIC CAR-1-W-0029 (NCR 1SN-10381-PW) for fillet welds and DIC CAR-1-W-0031 for missing MSSWRs. Further investigation necessitated the KG&E CAR 19 evaluation effort.

The welding of structural steel at Wolf Creek Nuclear Plant was essentially complete as of April 1, 1981. April 1, 1981 is a significant date in the history of the Wolf Creek Project in that it signified the date when all retraining of DIC Welding Inspectors was completed for fillet weld inspection (Ref. DIC CAR 1-W-0019). Subsequent to April 1, 1981 all fillet welds installed in ASME and Special Scope applications were reinspected in strict compliance with Design requirements. The reinspection was the result of significant deviations from acceptance criteria on support welds accepted prior to April 1, 1981.

Section III ADDITIONAL MEASURES OF CONFIDENCE

A. The following are additional actions that have taken place to assure that a satisfactory level of confidence exists to assure compliance to 10CFR50, ANSI N45.2, FSAR, Design and Procedural requirements.

The initiation of the KG&E Construction/Start-up Walkdown Group has given KG&E an added level of confidence in the Quality of the Daniel inspection program. This walkdown was performed by KG&E personnel after receiving notification from Daniel that the hardware installations were complete and accepted by DIC Quality. This walkdown was performed using the DIC installation traveler design documents for pipe supports. All other inspections were performed using the A/E design drawings and details. This verification was performed by inspecting for the attributes defined by the A/E as key quality characteristics. Inspections were performed on Pipe, Pipe supports, Mechanical Equipment, Electrical Terminations, HVAC, Civil and Electrical Room and Area Turnovers. Upon completion of these walkdowns, discrepancies were identified to Daniel and were handled in accordance with approved applicable procedures. Reworks associated with any of these discrepancies were also inspected by the walkdown group. While these walkdowns have identified discrepancies they have also served to strengthen the program by making the construction organizations aware of weaknesses. No major generic problems have been identified during these walkdowns.

The effectiveness of this walkdown can by shown through the additional walkdown that has been performed by KG&E QA. A summarization of the purpose and results of QA's walkdown can be found in Section III C letter KQCLKQ-84-111 dated 11/27/84.

B. In addition to the KG&E Construction Walkdown the 79-14 walkdown has been performed by Bechtel Power Corporation. This walkdown was performed to assure that final installations within the stress boundaries analyzed by the A/E for N-5 scope were installed to the A/E design requirements. Walkdowns were performed using design drawings and details. Discrepancies found were documented and either reworked or received a "Use As Is" disposition by the A/E. During the 79-14 walkdown there were no major discrepancies identified that were generic in nature.

C. See attached letter KQCLKQ-84-111

D. A review of Daniel and KG&E generated CARs was performed to determine if any Quality Assurance problems existed as were noted in KG&E CAR 19. Excluding the two DIC CAR's (29 & 31) that are associated with KG&E CAR 19, there were no other CAR's that had significant problems pertaining to Daniel's inspection and documentation that were not properly closed out through installation inspections and /or documentation reviews. See attached letter KQWLKQW-84-456 for review of KG&E generated CARs.

E. Inspections by the NRC have been conducted in all the major construction disciplines. These include the following as a minimum.

- Electrical installation and Terminations
- Mechanical supports for Pipe, Electrical and HVAC
- Mechanical installations including bolting
- Civil (Concrete and Coatings)
- Material Control
- Traceability
- Nondestructive Testing
- Personnel Qualifications (Welder and Quality Personnel)
- Procedure Reviews (All Disciplines)

Although some inspections by the NRC have noted program inadequacies, these have been resolved through their violation reporting system or the DIC nonconformance program. Areas of concern recognized by the NRC have continually made KG&E aware of potential problem areas, regularatory requirements and project commitments. All these items collectively have been beneficial to the Quality Assurance Program here at WCGS and have strengthened our overall program.

F. A Construction Self Assessment (CSA) was performed by the Delian Corporation. The basic objective of the CSA was to evaluate the adequacy of construction at the site. A sampling of construction hardware was selected from the following disciplines:

- Electrical and Instrument Construction
- Mechanical Construction
- Welding and Nondestructive Examination
- Civil and Structural Construction
- Material Traceability and Maintenance
- Quality Control Effectiveness
- Quality Assurance and Engineering Change Control

The primary over all conclusion from the CSA effort is that, based on the hardware and documentation reviewed, Wolf Creek construction workmanship and inspection practices appear equal to and, in some areas, better than industry standards. The hardware and documentation review included detailed inspections of installed and quality control accepted hardware. The size and diversity of the hardware, together with the substantial number of attributes examined for each item inspected, provided reasonable assurance that Wolf Creek is constructed in accordance with design and installation procedure requirements. Discrepancies which were detected during the CSA activity were documented on a CSA concern/close out form.

FORM 1177 REV 1-67

KGE

INTEROFFICE CORRESPONDENCE

TO: R. M. Grant, Director Quality

KQCLRQ 84-111

FROM: G. W. Reeves, Superintendent Quality Control G W Reeves

DATE: November 27, 1984

SUBJECT: KG&E QA Walkdown Surveillance Program

This correspondence is to summarize the purpose and results of the KG&E QA Walkdown Surveillance Program.

In December, 1982, the KG&E QA Surveillance Section peformed a hardware and documentation review of the second mechanical system to be turned-over from the Constructor (DIC) to KG&E. The system was the Refueling Water Storage System (BN). The problems identified suggested that neither DIC nor KG&E were sufficiently aware of the status of incomplete work, nonconformances and documentation at the time of turnover.

The NRC used the results of the "BN" surveillance as the primary basis for enforcement action and civil penalty. In response to the NRC, KG&E committed to an enhanced hardware walkdown and documentation review effort for system turnovers. Additionally, in order to assure continued compliance, KG&E committed to KG&E QA surveillance coverage of each system turnover. The KG&E QA Walkdown Surveillance Group was formed to satisfy this NRC committment.

Primarily, the QA Walkdown Surveillance effort monitored the effectiveness of the KG&E Construction Walkdown program. This was accomplished utilizing a team of QC inspection personnel hired specifically for this purpose - each person hired had been certified by a previous employer.

The QA walkdown team was divided into three disciplines; electrical, piping/HVAC, and hanger/instrumentation. At the time of each safety related system turnover, each group would walkdown a portion of the system - about 20% of the hardware/documentation would usually be checked. Attachment 1 identifies each safety-related system and the corresponding QA Walkdown Surveillance Report(s). Instructions and checklists were developed which identified the attributes to be checked during the walkdown surveillances.

Findings from each walkdown surveillance were compared to the system exception list and the results of the KG&E Construction Walkdown. The most significant findings were normally found to have been previously identified; those items not identified were typically various and minor - not indicative of a significant quality - program breakdown. Quality Program Violations (QPV's) were issed when specific, implementation or programmatic weaknesses were identified. These QPV's served as constructive feedback to the DIC and KG&E Construction turnover efforts. Attachment 2 depicts the number of QPV's issued to KG&E Construction as a result of the QA walkdown surveillance effort. This chart demonstrates the effectiveness of these QPV's; only one QPV was issued after November, 1983.

Overall, the KG&E QA walkdown surveillance effort found the Wolf Creek turnover/walkdown program to be effective in ascertaining the status of incomplete work, nonconformances, and documentation at the time of turnover.

GWR/rw

ELECTRICAL DISCIPLINE

System	Surveillance Report No.
NG	S-675
SA	S-676, S-748
BL	S-677, S-783
RL-1	S-678, S-747
RP-2	S-685
RP-1	S-686
GF-4	S-711
KA	S-712, S-774
EG	S-713, S-745
GE	S-714, S-751
NK	S-716
GK	S-717
FC-1	S-718, S-753
NE	S-719, S-800
EC-1	S-727, S-755
JE	S-728, S-752
SB	S-730
GD	S-731, S-759
BM	S-733
HB-1	S-739, S-754
AE	S-740
EF-1	S-741
EM-1	S-742, S-820
EM-2	S-742
BG-1	S-744
BG-2	S-744
GL	S-746, S-823

System	Surveillance Report No
NE	S-750
KJ	S-775, S-797
DN	S-776, S-777
AC-2	S-779
PJ	S-780
PK	S-781
GF-3	S-796
LE	S-822
BN	S-828
AL	S-829

HVAC DISCIPLINE

System	Surveillance Report No.
GD	S-695
GF	S-736, S-914
GL	S-758
GK	S-763
GG	S-782
GN01	S-896
GT	S-897
GK	S-898
GP	S-901

PIPING DISCIPLINE

System	Surveillance Report NO.	System	Surveillance Report No.
AL	S-666	HB-1	S-1001
AB-1	S-673, S-702	HK	S-1003
KA	S-674		
BN	S-684		
AE	S-689		
BM	S-690		
BL	S-701		
EG	S-749		
EF-1	S-757		
BG-1	S-766, S-961		
BG-2	S-766, S-997		
EC-1	S-768, S-900, S-1007		
FC-1	S-769		
JE	S-722, S-1004		
EM-2	S-785		
HB-1	S-786		
EM-1	S-806		
EJ	S-816		
BB	S-821		
KJ	S-837		
SJ	S-838		
EF-2	S-844		
EP	S-854		
GM	S-884		
BG-3	S-886		
GP	S-901		
EN-1	S-913		

MECHANICAL
EQUIPMENT DISCIPLINE (Peformed by Piping/HVAC Group)

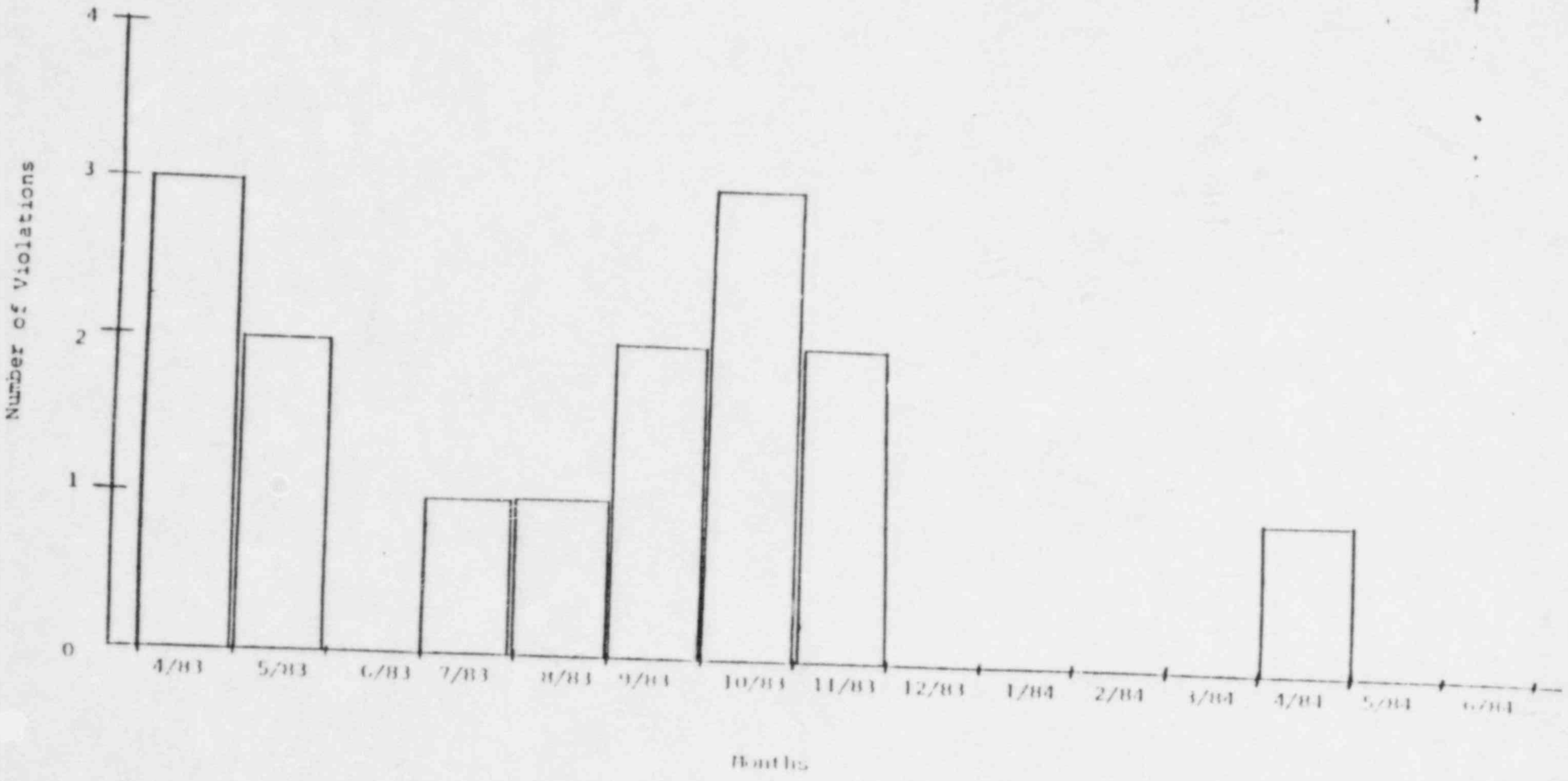
System	Surveillance Report No.
	S-813
EJ	S-815
KE-1	S-817
BB	S-833
GN-1	S-841
AL	S-842
BN	S-846
GF-4	S-914
EC	S-928
EF-2	S-943
GG	S-999
GM	S-1002
EP	S-1005
GL	S-1014

INSTRUMNTATION DISCIPLINE

System	Surveillance Report No.
AL	S-696, S-910
AB-1	S-697, S-881
EG	S-698
BM	S-699
EF	S-720
FC-1	S-721, S-942, S-952
BN	S-722
BB	S-852
KJ	S-883, S-916
JE	S-883, S-931
KA	S-883, S-931
GS	S-1141
GK	S-942, S-952
GN	S-952, S-1024
GG	S-952
EC	S-974
EN	S-974
EP	S-1024
AE	S-1155
EJ	S-1155
BG	S-1156
GT	S-1141
HB	S-1141
SJ	S-1141

Attachme

NUMBER OF VIOLATIONS ISSUED TO KG&E CONSTRUCTION WALKDOWN
RESULTING FROM QA WALKDOWN SURVEILLANCES



ATTACHMENT TO SECTION III D

FORM 1177 REV 1-67

KGE INTEROFFICE CORRESPONDENCE

TO: W.J. Rudolph II

KQWLKQW 84-456

FROM: T.W. Halecki TWHalecki

DATE: November 26, 1984

SUBJECT: Review of KG&E Generated Corrective Action Request

In support of KG&E CAR No. 19, I have reviewed all of the KG&E initiated CAR's. The general review was conducted to determine if any of the CAR's were similar in nature to the Quality Assurance problems as noted by KG&E CAR No. 19. CAR No. 19 noted inadequacies in inspection and documentation by Daniels. This review will determine if other CAR's pose any significant problems as far as inspection by Daniels. Listed below are the CAR's reviewed and the results of the review.

CAR No.	SUBJECT	SITE IMPACT
1	Drawings out of revision	No Impact
2	Storage vault does not contain the proper environmental controls	No Impact
3	No security procedures	No Impact
4	Gulf Alloy not providing the correct documentation for various fittings	No Impact
5	Internal pipe cleanliness	No Impact
6	Internal pipe cleanliness	No Impact
7	Internal Pipe cleanliness	No Impact
8	Inadequate document control on obsolete documents and change information not controlled and translated into travelers	No Impact
9	Deficiencies in the mechanical/welding surveillance program, surveillances not being performed as prescribed	No Impact
10	QE not reviewing travelers for accuracy	No Impact
11	Not issued	N/A
12	Work Request not properly processed, temporary modification log used in correctly and nonconformance reports not properly initiated, tracked and closed.	No Impact

13	Permanancy of corrective action	No Impact
14	Insulation contractors tampering with pipe supports	No Impact
15	Minimum separation violated	No Impact
16	Inadequate documentation and documentation review	No Impact
17	Inadequate review, processing and documentation pertaining to KG&E Work Request	No Impact
18	Start-up Field Reports not being properly processed	No Impact
19	Miscellaneous Structural Steel Welding (AWS-D1.1) (This is the subject of the CAR Review)	N/A
20	Lack of procedural compliance for start-up and operations activities	No Impact

In summary, other than CAR No. 19, no other significant problems pertaining to Daniels inspection and documentation were noted by the review.

TWH/sjs

RESPONSE REQUIRED: YES _____ BY: _____

NO __X__

THIS SECTION OF THE APPENDIX IS A LISTING OF ALL SUPPORTIVE AND INVESTIGATORY DOCUMENTS UTILIZED IN PREPARATION OF THE KG&E CAR-19 FINAL REPORT. THE VOLUME OF THESE COLLECTIVE DOCUMENTS PROHIBITS THEIR INCLUSION IN THE BODY OF THE FINAL REPORT. THESE DOCUMENTS HAVE BEEN TRANSMITTED TO KG&E QUALITY ASSURANCE AND ARE AVAILABLE AT THAT LOCATION.

16. DIC Quality Engineering interview results with 26 Quality Welding inspectors - Corrective Action 1c	IV.	Findings/Corrective Actions
17. Information from other utilities/A-E's on inspection of welds - Corrective Action 1d	IV	Findings/Corrective Actions
18. Letter BLKES-1348, C. Herbst to G. Fouts, of 11/5/84 - Corrective Action 1d	IV	Findings/Corrective Actions
19. Letter KNPLKWC 84-065, J. Bailey to G. Fouts, of 11/13/84 - Corrective Action 1d	IV.	Findings/Corrective Actions
20. DIC Comparison of ANSI N45.2.6 requirements, 1973 vs. 1978 - Corrective Action 1f	IV.	Findings/Corrective Actions
21. Mapper printouts of statistical data compiled from reinspections - Corrective Action 1f	IV.	Findings/Corrective Actions
22. DIC Quality Engineering analyses of reinspection data - Corrective Action 2a	IV.	Findings/Corrective Actions
23. Design Change Notice C0011, Rev. 7 of '23/78 - Corrective Action 2a	IV.	Findings/Corrective Actions
24. Drawing C0011, Rev. 12, detail 10 and note 14 - Corrective Action 3a.	IV.	Findings/Corrective Actions
25. NCR 1SN 20509CW on Pressurizer Supports - Corrective Action 3a.	IV.	Findings/Corrective Actions
26. NCR's 1SN 21308CW, 1SN 21309CW, 1SN 21310CW, 1SN 21311CW on the Polar Crane girder radial stops - Corrective Action 3a	IV.	Findings/Corrective Actions
27. American Bridge drawing E117 detailing Polar Crane girder radial stops - Corrective Action 3a	IV.	Findings/Corrective Actions
28. Drawing C-0S2963 detailing Polar Crane girder radial stops - Corrective Action 3a	IV.	Findings/Corrective Actions
29. Drawings GOS2919, GOS2924 and C121-8773-03 on Incore Tubing Supports - Corrective Action 3a	IV.	Findings/Corrective Actions
30. NCR 1SN 21273CW on missing channel clip welds - Corrective Action 3a	IV.	Findings/Corrective Actions

31.	NCR 1SN 20495CW on investigation of missing weld inspected by R. Smith - Corrective Action 4a	IV.	Findings Corrective Actions
32.	NCR 1SN 20798CW on investigation of missing weld inspected by V. Barb - Corrective Action 4a	IV.	Findings/Corrective Actions
33.	KG&E Surveillance Report S-372 - Corrective Action 5a	IV.	Findings/Corrective Actions
34.	Summary Report for Corrective Action 1a	IV.	Findings/Corrective Actions
35.	Summary Report for Corrective Action 1b	IV.	Findings/Corrective Actions
36.	Summary Report for Corrective Action 1c	IV.	Findings/Corrective Actions
37.	Summary Report for Corrective Action 1d	IV.	Findings/Corrective Actions
38.	Summary Report for Corrective Action 1e	IV.	Findings/Corrective Actions
39.	Summary Report for Corrective Action 1f	IV.	Findings/Corrective Actions
40.	Summary Report for Corrective Action 2a	IV.	Findings/Corrective Actions
41.	Summary Report for Corrective Action 3a	IV.	Findings/Corrective Actions
42.	Summary Report for Corrective Action 4a	IV.	Findings/Corrective Actions
43.	Summary Report for Corrective Action 5a	IV.	Findings/Corrective Actions
44.	DIC Program Assessment Report	I. II. V.	Executive Summary, Introduction, Conclusions
45.	DIC Corrective Action Report I-EW-0046	I.	Executive Summary
46.	Completed Corrective Action Schedules for CAR-19		
47.	Listing of all DIC NCR's generated during CAR-19 activities		

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICE OF
INVESTIGATIONS

U.S. NRC
'84 NOV 19 AM 10:05
OFFICE OF INVESTIGATIONS
HEADQUARTERS

November 16, 1984

Hi Deloris!

The attached documents were requested by Mr. Hayes on 11/15/84. We tried to fax them but the copies did come come through to you clear enough to read.

Connie

To! Ted. G,

Appendix I-5

NRC Form 307
(11-82)

ALLEGATION DATA FORM

Instructions on reverse side

U.S. NUCLEAR REGULATORY COMMISSION

RECEIVING OFFICE

1. **Facility(ies) Involved:** (If more than 3, or if generic, write GENERIC)
(Name) WOLF CREEK
BURLINGTON, KANSAS
Docket Number (if applicable) 050 00482

2. **Functional Area(s) Involved:** (Check appropriate box(es))
☐ operations
☒ construction
☐ safeguards
☐ other (Specify)
☐ onsite health and safety
☐ offsite health and safety
☐ emergency preparedness

3. **Description:** (Limit to 100 characters)
SENSITIVE

Q4-84-052

4. **Source of Allegation:** (Check appropriate box)
☐ contractor employee
☐ licensee employee
☒ NRC employee
☐ organization (Specify)
☐ other (Specify)
☐ security guard
☐ news media
☐ private citizen

5. **Date Allegation Received:** MM DD YY: 11 19 84

6. **Name of Individual Receiving Allegation:** (First two initials and last name) R.K. HERR

7. **Office:** OIR4

ACTION OFFICE

8. **Action Office Contact:** (First two initials and last name)

9. **FTS Telephone Number:** -

10. **Status:** (Check one)
☐ Open, if followup actions are pending or in progress
☐ Closed, if followup actions are completed

11. **Date Closed:** MM DD YY

Appendix
I-6

12. **Remarks:** (Limit to 50 characters)

13. **Allegation Number:** Office - Year -A- Number

28 NOV 84

Wolf Creek / Kerr/Tom

1. one isolated weld

2. substantial # of missing weld Rec.

3. # of documents showing welding but NO actual weld - similar to #1↑

4. Wait until Dec 1, 1984 when KG&E corrective action program is issued to possibly start investigation

3 Dec

1. Single Rec on Weld - NRC INSP. & QUALITY FIRST & LIC DID AN INVEST.

2. KG&E is Re-insp every Weld for SUBSTANTIAL MISSING Rec. & NRC INSP. & $75,000 for MISSING Rec.

3. Poss. "Q" to determine Resp. on part of Daniel / KG&E

Appendix I-7

FOIA 85-101

Q4-84-052

Two QC DIC Inspectors that claimed to have inspected welds

Reinspection revealed these two welds did not exist

REF. NRC Reg 4 Inspection 84-22 dated 26 Oct 84 (pg 7, Para 3, line 4)

KG&E response CAR19 DEC 84

Have NRC Accepted????? (5% power lic.)

PLAN

Interview two welders

Did you ever do it before?

Did anyone order you to make false inspection?

How did it happen?

BACKGROUND

CAR 19 identified 2 missing welds during reinspection. Weld inspection records existed

Internal investigation = HUMAN ERROR

SMITH - HAVE PHONE #

Missing Weld A — Inspector [redacted] inspected between 800-1000 structual steel welds (one error)

Beam connection very similar (same bldg coordinates) as steel directly below

Telecon interview= cause unknown/ neg info

BACB

Missing Weld B — Inspector [redacted] inexperienced (only 6 structual steel welds inspected)

confusion entering Joint numbers on MSSWR

related drawing found to be unclear and lacking clear designation of connection

Feb 27,85 Public Meeting Between NRC and KG&E

Bill Rudolph (KG&E QA) "The missing welds, the missing material also represented a QA program breakdown" (Pg.66)

Berra (DIC VP OPS) admitts discovery of missing welds (Pgs. 97 + 105)

DANIEL INTERNATIONAL JOHN BERRA

VERYL BARB

only did 6 structural steel
the rest were Temporary

DANIEL INTERNATIONAL
JOHN BERRA

Mar 8, 85

Randy Smith

Work (717) 542-2151

Home [redacted]

Conversation between R. K. Herr and Dick Denise on March 18, 1985:

1. NRC required KG&E to reinspect 100% of miscellaneous structural steel welding records (MSSWR).

    A. During reinspection, 91% of the welds were totally accessible.
    6% were partially accessible.
    3% were not accessible.

2. The blueprints (drawing), referred to in 4-84-026 regarding the fuel handling building, were included in the 100% reinspection.

3. The missing MSSWR for safety-related welds amounted to 1,509 out of 6,816. Region IV NRC is satisfied that the reinspection included the welds of the 1,509 records that were missing.

    A. NRC Region IV inspection report 84-22, dated October 26, 1984, identified the missing weld records and the missing welds that were erroneously reported as being visually inspected.

    C. KG&E answered report 84-22 with a KG&E Corrective Action ~~Report~~ Request (CAR) No. 19 ~~and CAR No. 31~~.

    B. NRC, although KG&E identified the missing welds and the missing MSSWRs, did not accept their resolution of CAR 29 & 31 (D&C) and required the 100% reinspection.

4. On November 21, 1984, NRC forwarded to KG&E escallated enforcement action amounting to a civil penalty of $75,000 for "failure to inspect" and "failure to take corrective action," (according to the Division Director, NRC Region IV, KG&E did not properly disposition CAR 29 & 31 ~~provide an adequate answer to 84-22 which~~ resulted in a possible interpretation that KG&E failed ot maintain records, even though the NRC had not requirement for KG&E (Daniel) [redacted] to maintain those records, (But commitment.

MAR. 18, '85
B. Hayes ADVISED AT Residence 1600hrs

OFFICE OF
INVESTIGATIONS

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

CASE 52

Review Transcript of Public Meets (Berra) see D. Danise

Look For Discrep. with CAR 19

Interview welders Insp RE documentation b/w nonweld.

Randy Smith = W

Veryl Barb = X

Did Anyone Direct
H Y E Done Are This Before

-2-

~~Q4-84-052~~ False Weld Record(s)   Finding 4 (CAR 19)

DIC "Inspector (W)" = [redacted] Randy Smith Aux. BLDg.

Beam 524B2

possible = Barb one level beneath where he should have been
Beam connection similar w/actual/paper connection
"Beam Below (524B2) connects at <u>same</u> BLDg coordinates
Tele con = neg info.

DIC "Inspector (X)" = [redacted] Veryl Barb Control BLDg.

Beam 95B5

① Smith = [redacted] only (6) six MSSWR's weld Inspections
② A cross out + initial show confusion by details on Erection Drawing
③ Probable Smith attempted to document Beam clips to Beam 95B5, MSSWR not available for these welds

CAR 19

Applicable drawings were reviewed for similarities in beam numbers, floor layout and beams at similar locations in an attempt to further identify possible sources of confusion. As a result of the investigations conducted only two (2) cases were identified where inspection documentation existed for welds not installed.

The first case is the installation of beam No. 524B2 and its connection to an embed in the Auxiliary Building. All available information indicates that DIC Quality Inspector W made a human error when documenting the inspection of this beam connection. A review of the drawings shows that the beam configuration and floor layout in the area (elevator shaft and equipment hatch) directly beneath the beam connection in question are very similar. In addition, the beam below beam 524B2 connects at the same building coordinates.

#1
[redacted]
Randy Smith

It is possible that Inspector W could have been one elevation beneath where he should have been when inspecting the connection. Out of the multiple welds inspected by Inspector W this problem occurred only once. If actions which would result in other conclusions had occurred, it would be reasonable to assume that they would have occurred repeatedly. Inspector W's signature appears on over eight hundred (800) MSSWR's. Each MSSWR could document multiple weld inspections, therefore, Inspector W very likely inspected over one thousand (1,000) structural steel welds, with the result that this type of problem occurred once. A telephone conversation between Inspector W and DIC management personnel concerning this incident revealed no information that Inspector W could offer, since he could not recall the specific connection from the more than eight hundred (800) he inspected. The root cause conclusion in this case is human error.

The second case is the installation of beam No. 95B5 to an embed in the Control Building. All available information suggests that DIC Quality Inspector X made a human error when documenting the inspection of this beam connection. The MSSWR documenting this connection shows Inspector X's confusion in that he entered the joint number incorrectly when filling out this portion of the MSSWR, then lined through, initialed and dated his error, and entered what he thought was a correct entry. Drawing K6711-XI-I-E13 details this connection, but is unclear in that it does not designate the connection number for the beam clip to embed weld, and only lists the beam seat number (91M1).

#2
[redacted]
Veryl BARB

Further research revealed that Inspector X completed one hundred eighty-three (183) MSSWR's during his tenure on site, but only six (6) of these MSSWR's were related to structural steel weld inspections. This is indicative that Inspector X was possibly confused by the details on the erection drawing. It is probable that Inspector X attempted to document the welds attaching the beam clips to beam 95B5, since no retrievable MSSWR is on file for these welds. These circumstances are documented on nonconformance report 1SN 20798CW for disposition and resolution. The root cause conclusion in this case is human error.

Finding #5 of CAR-19 stated, "Objective evidence that the mechanical and structural inspection/documentation problems identified in KG&E QA Surveillance Report S-372 were rectified has not been provided."

CAR 19

27833

The missing welds identified for installations involving other miscellaneous materials and welds missing are of a smaller quantity. Thorough investigation revealed the root cause of these missing welds to be due to a lack of formal follow-up and inadequate statuses of completed work and the subsequent completion of unfinished work. The missing welds on the Incore tubing supports revealed that all investigatory information supports the hypothesis that these missing welds were not installed due to oversite. The four lateral support brackets, two at each of the vertical angle supports (Incore tubing supports) located 32' - 2 3/4" north of the Reactor Center Line and 4' 10" east and west (one each direction) of Reactor Center Line on Drawing GOS2919 were added by revision to drawing GOS2924 after the supports had been presumed completed.

Nonconformance report 1SN 21273CW documents missing welds on channel clips to beam attachments. The channels that American Bridge Drawing #C121-10675 shows welded to a beam web along A2 at Elevation 2042' are bolted instead. The channel clips are bolted to the web using the same bolts as removable beams on the opposite side of the web. Research found that the installation of the channel and removable beam was late in the construction sequence of this area, also. Since the channel clips and removable beam clips are bolted through a beam web with the same bolts, the channel clip attachment welds were probably assumed to be unnecessary by the construction personnel responsible for installation.

If the removable beams had been disconnected for the purpose of construction, it would have become necessary to weld the channel clips to the beam web at that time. The beams and channel in question were installed late in the construction sequence of the area, removal of the beams never became mandatory, the welds were not a recognized priority and were never installed as required. The root cause of these missing welds is due to DIC error in assuming the bolted connections were acceptable rather than the required welds. In the miscellaneous group, investigations revealed that welds or material found missing were those welds or materials that would not impede construction progress related to that connection.

Finding #4 to CAR-19 stated, "One (1) weld was documented as having been inspected when in reality the weld was not made. (Ref. NCR 1SN 20495CW)."

Corrective Action 4a)

"Investigate the concern to determine the root cause of the error. Immediately notify KG&E Quality Assurance if any other problems of this nature are identified. Document the investigative actions. The notification of KG&E QA shall not preclude the issuance of an NCR."

The results of the CAR-19 inspection effort were tracked and each case where a missing weld or missing material was identified was researched thoroughly by DIC Engineering to determine whether documentation existed pertinent to the installation of the missing weld/material. Miscellaneous Structural Steel Weld Records (MSSWR's) were reviewed to determine if a trend or pattern existed. Nonconformance reports identifying missing welds were compared to MSSWR's to determine if there were repetitive occurrences.

NRC 84-22
DETAILS

3. Welding of Structural Steel

During a review of QA/QC and Quality First personnel qualifications and subsequent interviews, the NRC inspector became aware of potential problems with corrective action reports CAR 29 and 31. The NRC inspector subsequently obtained copies of the two documents. CAR 1-W-0029 (initiated on March 22, 1983) states, in part, "Subsequently to the issuance of CAR 1-W-0019, quality has instituted a random reinspection of accessible structural steel fillet welds in all Q buildings. It has been determined by the results of this reinspection that an unacceptable percentage of these welds are deficient in the auxiliary, control, and fuel buildings." Attached documentation revealed that in the auxiliary building, 60 welds were inspected with 53 being rejected. In the control and fuel buildings, 50 welds were inspected with 43 rejected, and 53 inspected with 35 rejections, respectively. Revision 2 to CAR 1-W-0029 stated in the disposition that the defective welds would be transferred to a Nonconformance Report (NCR). The NRC inspector obtained a copy of NCR ISN 10381PW which was used as the vehicle to carry out the direction provided by CAR 1-W-0029. It appears that DIC Project Welding Engineering personnel again reinspected the welds to more clearly define the nature and extent of the defects on a weld-by-weld basis. A majority of the defective welds were categorized as having "cosmetic" defects. The DIC recommended disposition was use-as-is for welds identified containing "cosmetic" defects. The NCR states that "cosmetic" defects include arc strikes, convexity, cold roll (understood to be synonymous with overlap), porosity, and acceptable amounts of undercut. The NRC inspector noted with respect to these defects that overlap is prohibited by the governing AWS D1.1-75 Code and specific acceptance criteria for the other defects are also defined by this Code. The engineer accepted the DIC recommendation stating, "This disposition is based on the understanding that the cosmetic defects outlined . . . of this NCR do not constitute violations of AWS D1.1-75." A written-in note labeled "SNUPPS comment" states that DIC had confirmed the engineer's understanding. NCR ISN 10381PW was completed as indicated above on August 30, 1983.

CAR 19

CAR 29

On August 16, 1983, DIC personnel issued CAR 1-C-0031 which indicated that approximately 16.4 percent of the miscellaneous structural steel welding records for "Q" welding could not be located. After corresponding back and forth, DIC and the engineer concluded that it was acceptable for some amount of these records to be missing, provided that the quality inspection program was acceptable. Senior licensee QA management expressed to the NRC inspector that the program had obviously been fully successful since very few welds had been found to require repair after a substantial reinspection effort associated with CAR 29. The NRC inspector expressed concern with this approach to resolution and suggested that the licensee reevaluate their position.

CAR 31

84-22

On September 11, 1984, the licensee, in conjunction with senior DIC managment personnel, made a presentation to the NRC Task Force Director and other NRC staff personnel, including the NRC inspector. The presentation was aimed at the DIC effort to provide adequate records of inspection of the structural welds. This effort involved the inspection at that point in time of 319 weld joints in the reactor building for which there appeared to be no records. Of these, 48 were found to not meet code/design original requirements. Several had been reanalyzed by the engineer and found to provide adequate structural strength and were deemed to be "use-as-is."

The NRC Task Force Director and the NRC inspector met with the KG&E Project Director on September 14, 1984. The NRC personnel informed the project director that the NRC position was that NCR ISN 10381PW had not been properly dispositioned and that, therefore, the underlying premise for the closure of CARs 29 and 31 was faulty. The NRC personnel stated that it appeared that the quality status of the majority of all structural steel welds was at best indeterminate. The project director proposed to have the engineer identify a group of structural members with the highest design loads or the lowest design strength safety margin and to have these joints inspected. The NRC personnel indicated that might be one possible approach to resolution of the matter.

During the week of September 17, 1984, a reinspection of the identified structural members with the highest design loads or the lowest design strength safety margin was initiated. The reinspection identified a number of welds which do not meet drawing requirements. This information was presented to the NRC staff during a meeting conducted on September 25, 1984. In an effort to confirm certain of the identified conditions, the NRC inspector accompanied DIC welding inspectors into the reactor building to observe specific, identified weld joints. This observation confirmed the welding inspectors' findings; e.g., welds that are undersized and of insufficient length, lack of fusion, and missing welds.

The missing welds are from the same location in each of six pressurizer support connections. Certain of the other welds in the pressurizer support connections were undersized and of insufficient length. Drawing No. C-OS 2904 shows that various length 5/8-inch welds are required in 14 specific locations. Four locations required a 5/8-inch fillet weld of 8 inches in length. The actual welds in two of the locations measured between 3/8-inch and 1/2-inch by 5 inches in length, and 1/2-inch by 3 inches in length. The missing welds and the undersized, insufficient length welds are clearly not in compliance with the requirements of the drawing or AWS D1.1-75.* The initial weld inspection records for these connections could not be located.

The NRC inspector accompanied two DIC welding inspectors for reinspection of nine structural steel connections in the auxiliary building. Drawing

No. K6720, applicable to these connections, shows 12 weld locations per connection with certain of the welds requiring returns. Reinspection of the welds and returns involved provided the following summarized data:

Missing welds	2
Welds with insufficient length	9
Undersized welds	6
Undersize welds with insufficient length	2
Overlength returns	44
Undersize returns	25
Undersize returns with insufficient length	1

The NRC inspector requested the initial weld inspection records for these welds and returns in the 9 reinspected connections. As of September 28, 1984, the only inspection records that were located pertained to 10 welds and 6 returns in one connection, and 8 welds and 4 returns in each of 3 other connections. These records did not indicate that the welds were anything other than acceptable. The licensee informed the NRC inspector of a situation where one inspection record for connection 524B2, clearly indicated by an attached sketch, the existence of the a weld that reinspection found not to exist. This problem will be followed up in conjunction with the other structural steel problems.

The NRC inspector made a comparison between the existing initial inspection records and the results of the reinspection effort in order to determine the validity of the initial records. The initial records show that the 10 welds with 6 returns in one connection were inspected and accepted on December 11, 1978. The reinspection identified one undersized weld, other undersized and overlength returns, and three overlength returns. The initial records for the other three connections show that eight welds with four returns per connection were inspected and accepted on September 8, 1979. The reinspection of these welds and returns identified two returns which were overlength and undersized and two returns which were overlength per connection.

The failure to execute the required welding inspection program is a violation of Criterion X of Appendix B to 10 CFR Part 50. (482/8422-01)

4. Observation of Electrical Separation (Class IE Cables)

The NRC inspectors observed the completed electrical cable work for conformance to the separation criteria specified in the FSAR, IEEE standards and site procedures. The specific areas inspected were the physical separation between redundant safety groups and between safety and non-safety groups. The plant areas inspected were the following:

Applicable drawings were reviewed for similarities in beam numbers, floor layout and beams at similar locations in an attempt to further identify possible sources of confusion. As a result of the investigations conducted only two (2) cases were identified where inspection documentation existed for welds not installed.

#1 The first case is the installation of beam No. 524B2 and its connection to an embed in the Auxiliary Building. All available information indicates that DIC Quality Inspector W made a human error when documenting the inspection of this beam connection. A review of the drawings shows that the beam configuration and floor layout in the area (elevator shaft and equipment hatch) directly beneath the beam connection in question are very similar. In addition, the beam below beam 524B2 connects at the same building coordinates.

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KANSAS GAS AND ELECTRIC COMPANY

FINAL REPORT

CORRECTIVE ACTION REQUEST NO. 19

FINAL REPORT

KG&E CORRECTIVE ACTION REQUEST NO. 19

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I. CAR-19 EXECUTIVE SUMMARY

Because of deficiencies (i.e., undersize, undercut,...) previously found in fillet welds on ASME and Special Scope hangers, DIC performed a random reinspection of structural steel fillet welds in February, 1983 in all "Q" designated buildings in the Powerblock. This reinspection indicated that an unacceptable percentage of structural steel fillet welds were deficient in the Auxiliary, Control and Fuel Buildings. A Corrective Action Report (CAR 1-W-0029) was initiated by DIC to implement reinspection, and nonconformance reports were generated to document and disposition deficiencies noted.

Subsequent to the issuance of CAR 1-W-0029 it was determined, during the course of document reviews in the Building turnover process, that Miscellaneous Structural Steel Weld Records (MSSWR's) could not be located as procedurally required for all structural steel welds in "Q" designated buildings. These missing MSSWR's resulted in DIC issuance of CAR 1-C-0031.

The concerns addressed in CAR's 1-W-0029 and 1-C-0031 as well as other items listed in the "Introduction" section of this report caused KG&E Construction Quality Control to initiate a limited inspection verification program. Through this inspection program additional concerns were raised as a result of the inspection verification results. These results identified instances of missing welds which had no inspection records, two missing welds which had inspection records, and welds with inspection records that did not completely comply with project inspection and documentation criteria. The results of the verifications combined with the missing weld inspection records identified the need for a formalized action plan to fully investigate the concerns and formulate corrective action as necessary. To accomplish this KG&E QA initiated Corrective Action Request 19, describing the concerns and recommending corrective action on October 17, 1984. Based on the corrective actions recommended by CAR-19 and additional actions deemed warranted in support of the investigations, a Management Plan was developed to designate the nature and extent of the investigations.

The Management Plan covered three basic categories of investigation and evaluation. One category was a process of reinspection to identify and evaluate actual hardware conditions in the field. A second category addressed the programmatic aspects of Structural Steel erection through evaluation of both construction and quality program procedures. A third category addressed related considerations such as other AWS D1.1 applications, evaluation of missing welds identified during the reinspections, evaluation of acceptable inspection records completed for welds found to be missing, and review and evaluation of surveillances, audits, and reports pertinent to AWS welding. Although not initially in the scope of KG&E CAR-19, non-welding related quality programs were reviewed for comparable programmatic deficiencies. In accomplishing this KG&E and DIC conducted an extensive program assessment of the Piping, Hanger, Mechanical, Electrical and Civil disciplines to ascertain the adequacy of the construction and quality programs instituted. This program assessment was conducted by KG&E and DIC Management representatives, and concluded that a satisfactory level of confidence exists to assure compliance of these to 10CFR50, the FSAR, ANSI N45.2, and design and procedural requirements.

The intent of the program evaluation was to evaluate the various construction and quality programs/procedures to determine their compliance to the AWS D1.1 Welding Code and FSAR commitments. This evaluation included relevant aspects of the various related programs from the initiation of purchase orders for procurement of structural steel and welding materials, to final installation and quality acceptance. The procedures for receiving, storage and handling of materials were evaluated, as well as compliance of procedures for training and certification of inspectors to ANSI N45.2.6 and welder qualification to AWS requirements. The procedure reviews included a thorough evaluation from their origination through subsequent revisions, including an analysis to assure current conformance to design document requirements. No findings were noted that were determined to be contributing factors to inadequacies in AWS D1.1 applications, although some procedural inadequacies were discovered and reconciled.

All other safety-related programs utilizing AWS welding were analyzed to ensure that the root cause identified as the reason for previous acceptance of deficient structural steel welds was not inherent, or impactive, to these programs as well. The method of documenting weld inspections, control of this documentation, and accountability to assure all required documentation was retrievable was researched for AWS D1.1 welding applications in raceway supports, electrical equipment, mechanical equipment, fire dampers, safety-related HVAC ductwork and supports, miscellaneous steel and embed fabrication, and pipe whip restraints for assurance that problems similar to those encountered in structural steel did not exist. Previously compiled information including Construction Self Assessment Reports, KG&E QA Reports and Surveillances, DIC QA Reports, DIC Project Monitoring Program Audits, and DIC Corrective Action Reports were reviewed to determine if the results of previous investigations indicated other potential problem areas relevant to AWS D1.1 welding. No findings were noted that could be considered to be contributing factors to inadequacies in AWS D1.1 programmatic applications. An analysis of hardware installations for other project applications of AWS D1.1 welding identified one other area to be investigated for AWS welding problems. This is in the area of electrical equipment installations where the method of permanent installation is by welding the equipment mounting frame to foundation embeds. DIC is addressing this potential problem on Corrective Action Report No. 1-EW-0046.

Reinspection of field welds was conducted utilizing AWS Certified Welding Inspectors who were also certified to the DIC Quality Program requirements of ANSI N45.2.6. Inspections were performed in strict compliance to the Inspection Verification Plan which established inspection criteria and documentation requirements, and was incorporated into an existing DIC Quality Procedure, QCP-VII-200, and approved by DIC, Bechtel, and KG&E.

DIC and Bechtel research substantiated that all welders and welding procedures applicable to AWS D1.1-1975 welding of structural steel installations were qualified in accordance with AWS requirements. Research by DIC and Bechtel resulted in assurance that the programs and procedures for the purchase and control of weld filler materials used in AWS D1.1 applications were in compliance with AWS requirements, and were properly implemented on site.

The retrievability and control of Miscellaneous Structural Steel Weld Records was thoroughly researched, and a determination made that inadequate implementation of DIC Construction procedures was the primary contributing factor relative to retrievability and accountability problems in this area.

15,000 missing weld [illegible] ?

An evaluation of the DIC Quality inspection training program demonstrated that this program and related procedures were in compliance to ANSI N45.2.6. Further investigation concluded that Quality inspection training was appropriate and adequate during the structural steel installation time frame.

An evaluation of DIC Quality inspection procedures and criteria applicable to the original structural steel installation/inspection period revealed several procedural inadequacies. A thorough analysis of the omission of each inspection criterion of AWS D1.1 structural steel applications was accomplished, with the conclusion that no adverse impact had resulted from these procedural inadequacies relative to AWS D1.1 welding inspection.

Inspection criteria to be used in the structural steel reinspection activities was procedurally defined and training of all personnel completed prior to reinspection initiation. Sufficient technical justification was established by Bechtel to validate inspection of welds through a predetermined maximum thickness of paint. An analysis of reinspection results determined the root cause of the previous acceptance of deficient structural welds to be due to DIC inspection implementation differences relative to inspection vs. reinspection techniques, and inadequate implementation of applicable DIC procedures during original inspection efforts. These inspection implementation differences are discussed elsewhere in this report, referencing the Reedy, Herbert, Gibbons documentary included in the Appendix, section VI.G.

Two joints (each missing one weld) of the two thousand six hundred sixty-nine (2,669) reinspected (representing more than 11,000 welds) had documentation reflecting the installation of these welds when in reality they were not installed.

Research revealed no evidence to indicate that either was a case of deliberate falsification. Additional investigations did indicate that human error was the cause of incorrectly documenting these nonexistent installations.

Reinspection found that approximately two (2) percent of the inspected welds were not installed as required by design documents. These errors were primarily due to craft/engineering confusion relative to installation drawing details and requirements. Failure to install these welds and materials, although in some cases determined to be significant in impact to stress allowable calculations, would not have resulted in material or structural failure if left uncorrected.

The total number of joints subjected to the reinspection program was two thousand six hundred sixty-nine (2,669). These joints were selected by Bechtel as structurally significant (See Appendix IV. D) with the distribution being: 693 in the Auxiliary Building, 1300 in the Reactor Building, 265 in the Control Building, 98 in the Diesel Generator Building, 36 in the ESWS Pumphouse, and 277 in the Fuel Building. The reinspection documented an as found condition regardless of the weld acceptability. All results were forwarded to Bechtel in the form of inspection data sheets for evaluation. This evaluation was based upon Bechtel's review of reinspection data accumulated and nonconformance reports (NCR's) generated. The evaluation for structural adequacy was made based upon this cumulative data that reflected the as-built condition of the structurally significant joints prior to any rework or repairs. No deficiencies were identified, which if left uncorrected, would have adversely affected the safe operation of the plant. The results of this evaluation provides assurance that Safety Related AWS D1.1 structural steel welding complies with all Quality criteria as specified in the related design documents, and is within the tolerances of acceptable deviation as determined by the Architect/Engineer.

Joints that in the as-built condition were determined to exceed the design allowable stresses were all reworked. In addition joints in which the design allowable stresses were not exceeded in the as-built condition but were missing welds were also reworked.

II. INTRODUCTION TO CAR-19

A series of activities as identified below pertaining to weld inspection at Wolf Creek ultimately led to the issuance of KG&E CAR-19 addressing AWS D1.1 Structural Steel welding concerns.

In September, 1980, DIC initiated Corrective Action Report 1-M-0007 due to improper inspection technique application, which required 100% reinspection of all socket welds on small bore piping installed prior to June, 1980. Subsequent to this reinspection effort, DIC generated Corrective Action Report 1-W-0019 on August 17, 1982, due to a significant quantity of fillet weld discrepancies being identified, which required 100% reinspection of all fillet welds on ASME and Special Scope piping hangers made prior to April 1, 1981. DIC performed a random reinspection of structural steel fillet welds in February, 1983, in all "Q" designated buildings in the Powerblock to determine whether structural steel welds may have been deficient as a result of the same root cause relative to CAR 1-W-0019. It was determined from these reinspection results that an unacceptable percentage of structural steel welds were deficient in the Auxiliary, Control, and Fuel Buildings. Thus CAR 1-W-0029 was initiated by DIC to implement reinspections, and nonconformance reports were generated to document and disposition the deficiencies noted.

As a result of documentation review prior to building turnovers DIC initiated CAR 1-C-0031 in August, 1983, to document that Miscellaneous Structural Steel Weld Records (MSSWR) could not be located as required by procedures for all structural steel welds in "Q" designated buildings. Nonconformance Reports were generated to document missing MSSWR's in each of these buildings.

KG&E and DIC site management held meetings in May, 1984, to further discuss retrievability of MSSWR's and the problems that had been identified to date. Concerns were expressed through KG&E Quality First to KG&E Construction Management regarding the acceptability of "Use-As-Is" dispositions given to NCR's written as part of CAR 1-C-0031's corrective action in July, 1984, and KG&E Management requested DIC to generate a revision to CAR 1-C-0031 in letter KWCLC 84-814 of July 30, 1984, in response to some concerns noted. Revision 6 to CAR 1-C-0031 was generated by DIC in response to KG&E's concerns.

KG&E Quality Assurance performed a detailed review of DIC CAR 1-W-0029 and 1-C-0031 in August, 1984, identifying numerous concerns to KG&E Construction. In response KG&E Construction began a documentation reconciliation task on August 13, 1984, to determine which safety-related structural steel welds did not have supportive MSSWR's.

On August 17, 1984, KG&E Construction Quality Control initiated an Inspection Verification Plan to provide an accurate assessment of the "as-built" conditions of safety-related structural steel welds without MSSWR's. DIC and KG&E Management discussed revision of this inspection program on August 30, 1984.

KG&E, DIC and Bechtel made a joint presentation to an NRC Task Force on September 10, 1984, which identified the belief at that time that the problem was one of document retrieval, and not a hardware problem. The NRC Task

Force discussed the problems with KG&E again on September 13, 1984, during which KG&E Management agreed to perform a sample hardware inspection of six (6) randomly selected structurally significant joints in the Reactor, Fuel, Control, Auxiliary, Essential Service Water, and Diesel Generator Buildings. This inspection resulted in the discovery of missing welds and missing structural members, which were reported to the NRC by KG&E under 10CFR50.55(e) on September 18, 1984. Subsequent meetings were held with NRC Representatives on September 25, 1984, and September 28, 1984, to status inspection efforts and provide information updates. An AWS Welding meeting was held with the NRC on October 19, 1984, on site relative to structural steel welding, with a follow-up meeting on October 22, 1984, in which KG&E Management discussed AWS structural steel welding concerns with the NRC.

On October 17, 1984, KG&E Quality Assurance issued CAR-19 to KG&E Construction to obtain corrective actions associated with AWS D1.1 structural steel welding. The findings addressed in CAR-19 included missing MSSWR's for safety-related structural steel welds; deficiencies being identified in previously accepted structural steel welds, missing structural welds or missing structural material; and documentation that a weld was inspected and accepted, but no weld was installed.

KG&E and DIC Management representatives subsequently developed a logic chart to organize resolutions relative to CAR-19's concerns, a Management Plan to implement corrective actions, and published a CAR-19 Corrective Action Schedule to provide a means for tracking corrective action progress.

In addition, KG&E Management contracted Lehigh University to review the problems associated with the structural welds in the structures at Wolf Creek Generating Station. The results of their review is included in Appendix VI.F of this report.

III. CAR-19 OBJECTIVES

To document a consolidated project plan for the identification, evaluation and resolution of problems associated with Safety-Related AWS D1.1 Welding.

To provide assurance, based on objective evidence, that AWS D1.1 Welding of Safety-Related Structural Steel complies with all Quality Criteria as specified in the related design documents and is within the tolerances of acceptable deviations as determined by the Architect/Engineer.

To provide assurance that the documentation which supports the inspection of safety related structural steel welds is:

- Available - Complete - Reflects appropriate information - Traceable to the item or activity

To evaluate supporting elements of the DIC Quality Assurance Program to ensure that those elements were adequately and effectively implemented to demonstrate that the DIC welding of Safety Related Structural Steel, HVAC Supports, Electrical Supports, Pipe Whip Restraints and any other AWS D1.1 safety related welding activities were in compliance with the FSAR (i.e. AWS D1.1 - 1975) and the Design and Construction QA Program Manual, Section 17.1.B.

To evaluate DIC Construction/Quality programs in areas other than AWS D1.1 welding to determine the potential of programmatic deficiencies.

IV. CAR-19, DISCUSSION OF FINDINGS AND CORRECTIVE ACTIONS

The KG&E Management Plan for the resolution of CAR-19 was developed by DIC and KG&E Management personnel to document a consolidated project plan for the identification, evaluation and resolution of problems associated with safety-related AWS D1.1 welding. The intent of this plan is to verify that both the hardware and programmatic aspects of all safety-related activities utilizing AWS D1.1 welding are in compliance with the FSAR and the Design and Construction Program Manual.

The logic chart for the resolution of CAR-19 was developed to illustrate the approach to be used in providing the verifications needed for implementation of satisfactory corrective action. The Corrective Actions as described in the KG&E Management Plan are identified in the flow of activities as designated on the logic chart. The logic chart is included as an attachment to this report in the Appendix, section VI.B.

Five (5) findings were included in CAR-19. The detailed activities and investigative actions required to implement each Corrective Action are delineated in the KG&E Management Plan. The process of corrective action for each finding generated by CAR-19 entails multiple activities. Each finding and it's respective corrective actions are discussed in detail in the following. Supportive and/or investigatory documentation for each finding as discussed in this section is delineated in the Appendix, section VI.I.

Finding #1 of KG&E CAR-19 stated, "The results of the Document Reconciliation Task Force indicated that 1509 of 6816 MSSWR's for Safety Related Structural Steel Welds are missing".

Six (6) corrective actions were prescribed as appropriate for the resolution of this finding and related concerns. These corrective actions were focused toward programmatic evaluations, procedural criteria evaluations, and a reinspection program utilizing certified inspectors. Following is each of the six (6) corrective actions for Finding #1 with an analysis of the investigative actions taken and a summarization of each corrective action's results in accordance with the KG&E Management Plan's directions.

Corrective Action 1a)

"Based on DIC program requirements assure that all of the welders and welding procedures were qualified to AWS D1.1."

This activity was subdivided into three elements of research. These elements included development of an AWS D1.1-75 Attribute Checklist analyzing individual attributes relative to the welding process. The checklist lists all AWS requirements and compares those requirements with DIC Construction Welding Procedure requirements, in each case citing explicitly how the corresponding DIC procedure addresses separate AWS criteria. This checklist is conclusive data that provides evidence of all AWS D1.1-75 criteria being adequately addressed by DIC Construction Welding Procedure, CWP-506, "Welding of Carbon Steel". An attachment to this checklist documents the procedure review cycle for CWP-506, showing that each revision from 09/14/78 through the current revision dated 05/21/81 was consistently reviewed and approved by the individuals designated that responsibility.

A second element of this activity was the statistical sampling of AWS Welder qualifications in accordance with MIL-STD-105D. The total quantity of retrievable Miscellaneous Structural Steel Weld Records (MSSWR) applicable to AWS welding was initially identified to define the total population to be used in selecting a sample size. A "Single Sampling Plan for Normal Inspection" was utilized, randomly selecting MSSWR's for review of welders' qualifications. This sample included a variety of welders, a variety of AWS welding procedures, a representative sample of welders during the 1978-1984 time frame, and sampling from welders working in all Powerblock buildings. Identification of welders was taken from the MSSWR's and welder qualification records (W-105). These were then reviewed to assure that each welder was qualified to the weld procedure entered on the MSSWR at the time of weld installation.

A sample size of two hundred (200) was selected as being most representative, given the previous considerations. Based upon Table II-A of MIL-STD-105D, DIC desired a ninety-six percent (96%) Acceptable Quality Level (AQL). This AQL accepts fourteen (14) rejectable units from a sample of two hundred (200), and rejects the entire population when the fifteenth (15) rejection of the sample is observed.

Research performed by DIC Welding Engineering revealed thirteen (13) incorrect entries on MSSWR's, with only four (4) of these considered "rejectable" due to the nature of the discrepancies. All thirteen discrepancies were due to incorrect entries being made on the MSSWR, with nine (9) of the thirteen having the weld technique entered as N-1-1-A-6 rather than N-1-1-A-6A. These two weld techniques were evaluated by DIC Welding Engineering by comparison of attributes and essential variables, and it was determined that no adverse impact existed. The four (4) entries considered rejectable were due to welders incorrectly entering a welding procedure number for which they were not qualified on an MSSWR.

A Nonconformance Report, 1SN 20984CW, was generated to document all thirteen (13) discrepancies noted, and was recommended for a "Use-As-Is" disposition by DIC Welding Engineering. This Nonconformance Report has been reviewed and disposition concurrence received from Bechtel, closing the NCR.

The third element of this activity was a review by Bechtel of DIC Welder Qualification Procedure and the DIC Welding Procedure Specifications to assure compliance to AWS D1.1-75.

Bechtel reviewed DIC Construction Welding Procedure, CWP-502, "Qualification of Welders", all revisions up to and including Revision 19. This review indicated full compliance with the AWS D1.1-75 for revisions 1 through 18. However, Revision 19 does not strictly comply with AWS D1.1-75 in the following areas.

1. CWP-502 Rev. 19, Paragraph 3.2 allows the DIC Project Welding Engineer to specify joint details not listed in Appendix II.

2. Joint designs for figures 5.2, 5.3 and 5.4 of Appendix II do not comply with AWS D1.1 joint designs for welder performance qualifications.

3. CWP-502 Rev. 19 does not specify the test positions for AWS D1.1 welder performance qualifications.

4. CWP-502 Rev. 19 does not specify the radiographic or mechanical testing requirements for AWS D1.1 welder performance qualifications.

Nonconformance Report 1SN21472MW has been generated to document these deviations and is awaiting disposition.

Bechtel randomly selected Welding Procedure Specifications (WPS) from MSSWR's applicable to structural welds in the 1978-1984 time frame. The review of the WPS' indicated full compliance with AWS D1.1-75 with one exception, undercut criteria, which was allowed by the Wolf Creek Final Safety Analysis Report, Revision 0, October, 1979. Three of the WPS' permitted undercut to be acceptable provided the depth did not exceed 1/32 inch, which is a relaxation of AWS D1.1-1975 undercut criteria.

The exception to the AWS D1.1-75 undercut criteria exists in Revision 0 of the Wolf Creek Final Safety Analysis Report, Section 3.8.3.6.3.3, dated October, 1979, and was also added by a revision to Bechtel Civil Specification C-122 and C-132, the design specifications applicable to the structural steel connections in the CAR-19 reinspection program. Based upon these facts the Bechtel Material and Quality Services Department (M&QS) determined that the WPS' used during erection/installation of structural steel members did comply with AWS D1.1-75. Paragraph 1.1.2 of AWS D1.1 defines the "Engineer" as the duly designated authority who acts for and in behalf of the Owner, and the exception to AWS undercut criteria was documented in the FSAR to comply with this paragraph.

It is Bechtel M&QS' conclusion that the review of the DIC WPS' and supportive documentation demonstrates that the welding procedures used by DIC during structural steel installation did comply with the AWS D1.1-1975 Structural Welding Code Edition when used concurrently with supportive design documents and the revisions to the FSAR.

In conclusion, the three elements of analysis included in the research performed on Activity 1a offer assurance that all DIC welding procedures were qualified in accordance with AWS D1.1-75 requirements.

Corrective Action 1b)

"Review the DIC Program for the purchase and control of filler material to ensure that only acceptable filler material was used in safety related welds. Assure that both safety related and non-safety related filler materials were properly controlled to preclude improper applications."

This activity was divided into two elements of research, those being; the DIC review of procedures for the purchase and control of filler and base materials, and Bechtel's review for the purchase and control of filler materials.

DIC Civil Engineering performed an in-depth review of the DIC Program for purchase of structural and miscellaneous steel and found the DIC Program to be in accordance with the requirements of Bechtel Specifications 10466-C-121 (Purchase of Structural Steel), and 10466-C-131 (Purchase of Miscellaneous Steel). These specifications and their respective DIC procedures were found to adequately address applicable requirements for assuring correct material specification, grade, marking, traceability and other Quality Assurance requirements. In addition these specifications and procedures provide for buyer verification of any or all of the established specification requirements.

The DIC procedures applicable to procurement activities are as follows:

AP-VII-01 Development and Approval of Bidders List

AP-VII-02 Requisitioning of Daniel Procured Materials, Equipment and Service

AP-VII-03 Bid Requests

AP-VII-04 Receiving and Processing Bid Proposals

AP-VII-05 Issuing Purchase Orders and Change Orders

During a self-initiated KG&E review of safety-related procurement records in January, 1984, several cases were identified in which DIC purchase orders did not comply with all A/E specification requirements. As a result of these findings, DIC initiated a Corrective Action Report (CAR) 1-G-0036, to perform a complete review of all purchase orders to verify compliance to specification requirements. This investigation encompassed the review of five hundred thirty-six (536) safety-related purchase orders to assure hardware and documentation to be in compliance with specifications. Any discrepancies identified during this review were documented on Nonconformance Reports for resolution by DIC, KG&E and the A/E. Those nonconformances identified relative to structural steel were determined to be all documentation related with no hardware impact. All corrective actions were completed, all Nonconformance Reports resolved and closed, and Corrective Action Report 1-G-0036 was closed on 05/24/84.

DIC Civil Engineering accomplished a detailed study of the control and issuance of base materials applicable to structural steel installations. This review was based upon a thorough analysis of material control requirements for this application in the following DIC procedures:

AP-VIII-02	Material and Equipment Receiving
AP-VIII-03	Identification, Marking and Inspection
AP-VIII-04	Receiving Discrepancies
AP-VIII-05	Material Storage and Control
AP-VIII-07	Material Issue
QCP-IV-111	Erection of Structural Steel and Pipe Whip Restraints
WP-IV-111	Structural Steel and Pipe Whip Restraint Erection

This review investigated such areas as the use of Structural Steel Fabrication Requests, requisitioning and issuance of the material to craft for erection, maintenance of traceability through heat number transfer for material that is divided, and documentation of this heat number on permanent plant records. DIC Civil Engineering's research concluded that acceptable control and utilization of base materials is maintained through DIC programs and procedures.

Bechtel's Materials and Quality Services Group furnished information based on their research to ensure that the DIC Procurement program had in fact resulted in the proper filler material being purchased and subsequently utilized in structural steel installation activities. This review was documented in attachments to a letter from B. W. Bain of Bechtel Materials and Quality Services to Gary Stanley on 10/16/84. This analysis entailed the following activities: (1) A review of purchase orders/certified material test reports for conformance to AWS D1.1 requirements to verify that all heat numbers for welding filler material are acceptable for structural steel installations, (2) A comparison of all E7018 weld rod heat numbers issued to the DIC Rod Room during the time frame of structural steel installation/erection to verify that correct filler material was used, (3) A review of the DIC weld filler material issuance control procedure/program to ascertain that welders were only issued filler material for the welding procedures to which they were qualified, and applicable to the work being performed.

The results of these investigations were positive, with no discrepancies being found. This effort further substantiates that correct weld filler material was utilized in structural steel erection.
DIC Welding Engineering reviewed the procedural details relative to issue of weld filler materials, identifying the control of filler materials explicitly for field issue as well as test shop issue. This review indicates that control is adequate, with supportive documentation, thereby assuring proper filler material issue. DIC Welding Engineering also noted that Quality Inspection performed, as required by DIC Construction Procedure QCP-VII-200, Inspection of Welding Process, random surveillances of welding process attributes. Among the attributes covered by this surveillance are that filler material control is implemented according to applicable welding procedures, and that the welder is currently qualified to the weld technique to be employed.

DIC Welding Engineering performed a review of the specification and procedural requirements relative to the purchase, issue and control of filler materials. It was determined that only E7018 electrodes have been used in AWS D1.1 applications, as required by all site AWS D1.1 welding techniques. All E7018 electrodes purchased by DIC are required to conform to AWS A5.1 (Specification for Mild Steel Covered Arc Welding Electrodes). To substantiate this fact DIC Welding Engineering performed a review of all purchase orders that involved E7018 electrodes. All these purchase orders were proven to have adequate documentation to justify that the electrodes conform to AWS specification A5.1.

Based upon procedural requirements, weld filler material issue controls, and random Quality Inspection surveillances, assurance has been provided that only acceptable filler materials have been utilized and that control has been as required for all AWS D1.1 applications.

Corrective Action 1c)

"Evaluate the adequacy of the DIC inspection criteria and procedures to determine if these elements could have adversely impacted the inspection results. Document and provide this evaluation to KG&E QA for review prior to inspection implementation. Any changes in inspection criteria and procedures shall be provided to KG&E QA for review prior to implementation."

This activity was divided into two elements. The first element was a review of DIC weld inspection criteria contained in QCP-VII-200. The inspection criteria was reviewed to determine compliance with AWS D1.1-75 and Bechtel Specifications 10466-C-132. The second element was to evaluate the results and determine if these elements could have adversely impacted the inspection results.

An AWS D1.1-75 and Bechtel Specification attribute checklist was developed by DIC Quality Engineering. Inspection criteria defined in QCP-VII-200, Appendix II was reviewed in accordance with the checklist. The review indicated that currently QCP-VII-200, Revision 20, meets or exceeds the inspection criteria as delineated in AWS D1.1-75 and the Bechtel specifications. The review of the QCP-VII-200 procedural history revealed most criteria was presented verbatim from AWS or the Bechtel specification. Other criteria, although not verbatim, was interpreted as being in compliance with AWS and the Bechtel specification. The review did indicate four (4) areas of inadequacy. The following is a list of these areas and the time frame affected:

1) Oversized Welds - 4/18/78 - 5/2/84 (Revisions 2 - 19)

   Inspection criteria for oversized welds was not delineated in QCP-VII-200 during this time frame.

2) Convexity - 3/30/77 - 1/18/83 (Revisions 0 - 15)

   During the time frame 3/30/77 through 12/15/81, QCP-VII-200 required the Quality Inspector to utilize the Weld Technique Sheet for compliance. During the time frame 12/15/81 through 1/18/83, QCP-VII-200 required: "Fillet welds may be slightly convex/concave." During the entire period, the following criteria was not delineated in QCP-VII-200 or the Weld Technique Sheets. "Except at outside corner joints, the convexity shall not exceed the value of 0.1S plus (+) 0.03 inches where S is the actual size of the fillet weld in inches."

3) Cracks - 12/15/81 - 5/26/82 (Revisions 9 - 11)

   Inspection criteria for cracks was not delineated in QCP-VII-200 during this time frame.

4) Lack of Fusion - 12/15/81 - 09/22/83 (Revisions 9-16)

   Inspection criteria for lack of fusion was not delineated in QCP-VII-200 during this time frame.

An evaluation was performed to determine if these procedural inadequacies could have adversely impacted the inspection results. The following is the results of the evaluation:

1) Oversized welds: Bechtel Specifications 10466-C-122 and 10466-C-132 were revised 4/18/78. This revision required oversized welds not to exceed 100% or 3/8" greater than specified, whichever is less. During a civil retrofit review of Bechtel specifications and DIC procedures, this procedural inadequacy was identified. Nonconformance Report 1SN 16988CW documented this deficiency and resulted in a recommended disposition of "Use-As-Is". Based on Bechtel's concurrence with this disposition, the omission of this item is considered to have no adverse impact to inspection results.

2) Convexity - Bechtel specifications required welds to meet convexity limits as delineated by AWS D1.1 until 12/08/82. After this date, Bechtel specifications altered the convexity requirement by stating that fillet welds need not satisfy convexity limits of AWS D.1.1. DIC Procedures have delineated criteria as "welds may be slightly concave/convex". Based on procedural control and the relaxed specification criteria, this item is considered to have no adverse impact to inspection results.

3 & 4) Cracks and Lack of Fusion - Inspection criteria for cracks and lack of fusion were inadvertently omitted during general revision from DIC inspection procedures on 12/15/81. The criteria was reinstated in site procedures on 5/26/82 for cracks and 9/22/83 for lack of fusion. The absence of this criteria occurred after the completion of main frame structural steel erection (5/81). However, to establish that there was no impact in other AWS D1.1 applications due to the omission of these items, twenty-six (26) DIC welding inspectors were interviewed. These interviews were used to determine the following:

   1) Procedures used for training and inspection.

   2) Inspection attributes addressed during training.

   3) Inspectors' awareness that cracks/lack of fusion criteria was omitted from procedures for a period of time.

   4) Did inspectors inspect/reject welds for cracks and lack of fusion?

The inspectors interviewed had inspected structural steel welds as well as HVAC and electrical support welds during the time frame in which the procedural deficiencies occurred. In all cases inspectors indicated that they had inspected/rejected welds for cracks and lack of fusion. Inspectors were aware of the procedural deficiencies, however, they continued to inspect/reject for cracks and lack of fusion. This is further substantiated based on re-inspection results conducted on structural steel. The rejection rate for cracks and lack of fusion is minimal when compared to the total number of welds inspected.

In conclusion, the review of weld inspection criteria utilized during the history of this project did indicate areas of procedural deficiencies. However, based on the above information, it has been determined that these inadequacies did not result in generic inadequacies in AWS D1.1 welding.

Corrective Action 1d)

"Obtain a documented evaluation to determine the validity of inspections performed with the presence of paint on the weld."

This activity was divided into three elements: obtain information from other utility/AE's that have developed a validation plan, with a subsequent review by DIC Welding Engineering and Bechtel and the addition of site specific requirements and justification, and Bechtel's submittal of a 'position letter' to KG&E for approval.

DIC Management obtained information from Carolina Power & Light Co., and Ebasco Services Incorporated relative to the validity of inspections performed with paint on the welds. This information was utilized by Bechtel in conjunction with their additional research to establish an A/E's position to KG&E. In summary, this position, more explicitly defined in letter BLKES-1348 from C. M. Herbst to G. L. Fouts, is: "With the exception of a number of attributes, fillet welds which have been coated with up to four (4) mils of primer and in some cases, up to an additional ten (10) mils of topcoat can be visually inspected to the AWS D1.1 acceptance criteria. Those attributes which cannot be fully evaluated are of little or no concern on the structural steel at WCGS."

This letter was submitted to KG&E, and subsequently KG&E discussed the validity of inspections performed with paint on welds with NRC representatives. KG&E Nuclear Plant Engineering reviewed letter BLKES-1348, concurring with the position stated by Bechtel in their letter KNPLKWC 84-065 of November 13, 1984.

Corrective Action 1e)

"Utilize personnel certified to ANSI N45.2.6-1978 for the inspection of safety related structural steel welds. Inspections shall be performed in accordance with the DIC Quality Program and training shall be performed and documented to assure that inspectors are cognizant of the DIC Quality program requirements."

This activity was divided into three elements. The first element required incorporation of the CAR-19 Inspection Verification Plan into DIC Construction Procedure QCP-VII-200, "Inspection of Welding Process". The second element required inspection personnel to be certified in accordance with the DIC certification program and ANSI N45.2.6-1978. The third element defined that the inspectors' site specific qualifications would be limited to the reinspection of structural steel welds in accordance with QCP-VII-200.

The Inspection Verification Plan was developed through the combined efforts of DIC, KG&E, and BPC personnel. Revision 0 was reviewed and approved by KG&E Quality Assurance on 10/19/84. Although Revision 0 to the Inspection Verification Plan in QCP-VII-200 was not issued until 10/19/84, some inspections were performed prior to this date by personnel qualified to accomplish these inspections. The same inspection criteria was utilized in these efforts, and all personnel performing these inspection functions were evaluated to ascertain their qualifications to be concurrent with the later certification requirements for KG&E CAR-19. Further discussion of these personnel is included in this discussion of Corrective Action 1e) on the following pages. A meeting was held with the Quality Inspection personnel on 10/20/84 to discuss the impact of the Inspection Verification Plan on their activities and to ensure their understanding of the plan. As a result of this meeting, a new revision, Revision 1, was issued to incorporate inspector feedback and KG&E Quality Assurance comments. Revision 1 of the Inspection Verification Plan was then incorporated into DIC Quality Procedure QCP-VII-200 with Procedure Change Notice 014. On 11/2/84 KG&E Quality Assurance, DIC, and BPC personnel held a meeting to address KG&E Quality Assurance concerns on gouges. Subsequently Revision 1 to PCN-014 was issued to incorporate these concerns into the Inspection Verification Plan.

It was decided that all personnel performing inspection verifications under the CAR-19 Inspection Verification Plan should not only be AWS Certified Welding Inspectors, but also be site certified under ANSI N45.2.6-1978.

ANSI N45.2.6-1978, Section 3.5.2 makes the following recommendations for education and experience when certifying Level II personnel:

1. One year of satisfactory performance as a Level I in the corresponding inspection, examination or test category or class, or

2. High School graduation plus three years of related experience in equivalent inspection, examination, or testing activities, or

3. Completion of college level work leading to an Associate Degree in a related discipline plus one year related experience in equivalent inspection, examination, or testing activities, or

4. Four year college graduation plus six months of related experience in equivalent inspection, examination, or testing activities.

When considering the certifiability of candidates, DIC management ensured that all personnel met the recommendations of section 3.5.2, ANSI N45.2.6-1978.

A training program for inspectors was established on 10/17/84. The program consisted of self study material covering the following subjects:

1. Quality Orientation

2. DIC Administrative Procedure AP-VI-02, "Nonconformance Control and Reporting"

3. The KG&E CAR-19 Inspection Verification Plan (PCN-014 to QCP-VII-200)

Additionally, a meeting was held on 10/20/84 with the inspectors to explain the contents of the Inspection Verification Plan, and to answer any questions they might have about the program. In order to ensure the capability of each candidate, a Field Practical Examination was also administered.

Certification files were compiled on each inspection candidate and are available for review in DIC Quality Training. Each file contains a copy of the inspectors resume', a signed copy of the Education/Experience evaluation form, a copy of the inspector's eye examination, the document of certification, the field practical examination, and the letter of recommendation. Additionally there is a training summary documenting the completion of required training and the training conducted on DIC Quality Procedure QCP-VII-200, PCN-14, Revision 0 and Revision 1.

Each certification file was reviewed by the DIC Quality Training Supervisor to ensure all candidates met the recommendations of ANSI N45.2.6-1978. Each file was again reviewed by the DIC Project Quality Manager (DIC's Certifying Authority) prior to the signing of the Document of Certification. The completed certification files were audited by KG&E Quality Assurance with no findings.

Eleven (11) personnel (Inspectors A through K) were involved in Structural Steel Inspection Verification prior to the issuance of KG&E CAR-19. These personnel were attached to DIC Engineering and were qualified, but not certified prior to the issuance of KG&E CAR-19.

In addition to the eleven (11) personnel above, an additional eleven (11) personnel (Inspectors L through V) were involved in Structural Steel Inspection Verification after the issuance of KG&E CAR-19. The certification status is given below:

INSPECTOR	STATUS
(1) A	Certified
(2) B	Certified
(3) C	Certified
(4) D	Certified
(5) E	Certified
(6) F	Qualified*
(7) G	Qualified*
(8) H	Certified
(9) I	Certified
(10) J	Certified
(11) K	Certified
(12) L	Certified
(13) M	Certified
(14) N	Certified
(15) O	Certified
(16) P	Certified
(17) Q	Certified
(18) R	Certified
(19) S	Certified
(20) T	Not Qualified**
(21) U	Certified
(22) V	Certified

NOTES:

* Personnel who were involved in Structural Steel Inspection Verification prior to the issuance of KG&E CAR-19, but were not involved in Inspection Verifications after the issuance of KG&E CAR-19 were investigated and qualified, but were not certified as they had already left the site or were assigned to other non-inspection related activities.

** Several attempts were made to verify Inspector T's experience after he left site. DIC Quality Training was unable to verify enough experience to qualify Inspector T's to ANSI N45.2.6-1978. All of Inspector T's work was reinspected by certified personnel.

Corrective Action 1f)

"Perform a 100% reinspection of all structurally significant safety related structural steel welds. The identification of "structurally significant" welds shall be made by the Architect - Engineer."

"Structurally significant" joints were defined by Bechtel as all field welded joints which support or potentially support safety related equipment and building components for the purpose of this Corrective Action activity. This basically included all field welds on structural and miscellaneous steel with the exception of handrail, toeplates, grating, checkered plate, stairs, ladders and monorail supports. These are non-Q items which typically see significant service loads during the construction process. Some are designated as II/I, however, II/I seismic loads are considered to be less severe than service loads. Monorails have been load tested as part of startup procedures, and were therefore not included in the scope of structurally significant items requiring reinspection. The joints were selected by Bechtel based on a review of erection drawings prepared by the structural and miscellaneous steel fabricators and a review of Field Change Request (FCR's), Nonconformance Reports (NCR's), Construction Variance Requests (CVR's) and Structural Steel Fabrication Requests determined applicable.

The DIC Nonconformance program, as defined in DIC Construction Procedure AP-VI-02, "Nonconformance Control and Reporting", was utilized to obtain and document a suitability for service evaluation of welds that were inaccessible due to physical location or embedment in concrete. All deficiencies identified during reinspection activities performed in accordance with Procedure Change Notice - 014 to DIC Construction Procedure QCP-VII-200 were identified on nonconformance reports for further dispositioning and resolution.

Bechtel performed a case by case evaluation of each structurally significant joint inspected according to the data furnished on Inspection Data Sheets and nonconformance reports. Their evaluation provided a determination of whether each structurally significant joint's as-built condition met design allowables, whether the as-built condition was a significant deficiency in accordance with 10 CFR 50.55(e), and whether any rework or repair to each joint was required.

The following is a statistical summary of the evaluation completed by Bechtel on all structurally significant joints:

TOTAL AWS WELDING
INSPECTIONS AND ENGINEERING EVALUATIONS

BUILDING	TOTAL JOINTS	JOINTS INSPECTED	JOINTS EVALUATED	JOINTS REQUIRING REWORK (1)	ADDITIONAL JOINTS TO BE REWORKED (2)	SIGNIFICANTLY DEFICIENT JOINTS (10CFR50.55(e))
AUXILIARY	693	693	693	7	42	0
REACTOR	1300	1300	1300	69	15	0
CONTROL	265	265	265	3	18	0
DIESEL GENERATOR	98	98	98	2	2	0
FUEL	277	277	277	0	6	0
ESWS PUMPHOUSE	36	36	36	0	0	0
TOTAL	2669	2669	2669	81	83	0

(1) DESIGN ALLOWABLE STRESSES ARE EXCEEDED IN THE AS-BUILT CONDITION

(2) DESIGN ALLOWABLE STRESSES ARE NOT EXCEEDED IN THE AS-BUILT CONDITION. THESE JOINTS ARE BEING REWORKED PER KG&E MANAGEMENT DIRECTION TO INSTALL MISSING AND UNDERLENGTH WELDS.

Finding #2 of KG&E CAR-19 stated, "An Inspection Verification effort of safety related structural steel welding, undertaken by AWS certified weld inspectors identified several areas of deficiencies. These deficiencies are categorized as: undersized welds, weld defects, incorrect configuration, weld underrun, and weld undercut."

One (1) corrective action was determined to be appropriate for resolution of this finding, although this primary corrective action was subdivided into seven (7) research/data accumulation activities.

Corrective Action 2a)

"Determine and document the "root cause" of the previous acceptance of deficient structural welds. Analyze the HVAC Support, Electrical Support, Pipe-Whip Restraint and any other safety-related program utilizing AWS D1.1 Welding to ensure that the same "root causes" inherent in the structural steel welding program were not generic to other programs."

This summary reviews activities 2a-1 through 2a-7 of CAR-19 to determine the root cause of the previous acceptance of deficient structural welds and analyzes those root causes to determine if they were inherent to other safety-related programs utilizing AWS D1.1 welding.

A review of DIC Quality procedures was performed by Quality Engineering to determine if any historical procedural inadequacies could have been a contributor to "root cause". Although some historical deficiencies in inspection criteria were found to have existed, research demonstrated that some of the procedural inadequacies occurred after the vast majority of structural steel erection activities had been completed. Interviews with a sample of Quality Inspectors revealed that inspectors were cognizant of the omission of two other criterion (lack of fusion and cracks) during an applicable time frame, but inspected for these deficiencies in spite of their omission. Based upon this cumulative research procedural weld inspection inadequacies are not considered to be contributors to "root cause" of previous acceptance of deficient structural welds.

DIC Inspection training and certification procedure AP-VI-01 was used to train and certify Quality inspection personnel during the structural steel erection time frame. This procedure was analyzed to verify compliance to ANSI N45.2.6-1978, and was found to be in accordance with ANSI requirements. An evaluation of ANSI N45.2.6 requirements revealed that DIC procedure AP-VI-01 was in full compliance to ANSI requirements for the structural steel erection time frame and through all subsequent revisions to date.

The "root cause" of the previous acceptance of deficient structural welds has been determined to be due to inspection implementation and inadequate implementation of related procedures. Each of these contributing factors has several facets that are considered to be partial reasons for "root cause".

Differences in inspection techniques and consideration of inspection attributes for the original inspection time frame vs. the CAR-19 reinspection time frame are definite root cause contributors. The differences indicated are common to the nuclear construction industry and have been recognized as prevalent at many projects. A white paper documentary prepared by recognized nuclear construction consultants Reedy, Herbert, Gibbons and Associates, Inc. dated August 11, 1983, clearly defines the subject differences during their in-depth analysis of weld inspection on nuclear sites. (See Appendix IV.G)

The differences cited, inspection technique and inspection attributes, are addressed in section I of this white paper, "Continuous Measurement of Fillet Welds". The paper states that until about 1980 accepted inspection practice did not entail 100% physical measurement of each inch of welding, but rather depended upon individual inspector's evaluation of the weld's acceptability. Around 1980 QA/QC Inspectors began using fillet weld gauges to measure each inch of fillet weld to verify that the specified minimum weld size was met for the continuous length of weld. This physical measurement gradually replaced the previous accepted practice of visual judgement. The paper concludes that there has been a progression of the practice of physically measuring each inch of weld to a serious extreme.

The documentary cites that there is no requirement either in the ASME Section III Code or AWS D1.1 Standard to continuously measure the full length of fillet welds. Both ASME and AWS permit deviations from minimum size fillets as documented in ASME NB/NC/ND - 4427 and paragraphs 8.15.1.7 and 9.25.1.7 of AWS D1.1. The paper further contends that inspections can and should be made on a random basis to determine nominal sizes with no detriment to safety. Additional sections of this documentary address "Undercut Provisions of AWS D1.1" and "Encroachment on Minimum Thickness" with similar conclusions.

DIC research has shown that the inspection technique implemented during erection/inspection of structural steel at Wolf Creek was in accordance with common industry practice as stated in the previously referenced documentary. Inspectors were of the understanding that visual judgement was acceptable as an inspection technique in checking for nominal weld size, and that visual evaluation rather than 100% physical measurement of fillet welds was acceptable for assuring that welds met visual inspection attributes.

Given these considerations, one should expect a reinspection program using current applicable techniques to find deficiencies in welds previously accepted. The reinspection technique is one of 100% physical measurement of all attributes applicable rather than the visual judgement initially employed as acceptable during the structural steel erection time frame.

With the previous considerations in mind, an examination of the weld deficiencies identified during reinspection and their relative significance to the overall integrity of the initial inspection effort is in order.

The scope of the CAR-19 reinspection effort identified two thousand six hundred sixty-nine (2,669) joints requiring reinspection. Of the two thousand six hundred sixty-nine (2,669) total joints, two thousand eight hundred seventy (2,870) welds exhibited discrepancies of the more than eleven thousand (11,000) welds reinspected according to procedure QCP-VII-200, Procedure Change Notice 14. Each weld reinspected could have potentially contained five (5) categories of deficiencies according to the method utilized for tracking during the CAR-19 program, those being: undersize, defects (cracks, lack of fusion, incomplete penetration, overlap, slag inclusions, porosity, craters), underrun, undercut and configuration. Of the two thousand six hundred sixty-nine (2,669) structural joints inspected, the following quantities of weld deficiencies were noted by category: 1,061 undersize, 330 defects, 476 underrun, 107 undercut, and 1,562 configuration.

The quantities of deficiencies noted for the three categories following are minor based upon a percentage comparison to the total number of welds reinspected. The approximate percentages for each of these three categories are, underrun 4%, undercut 1%, defects 3%. These percentages are within expectations considering reinspection emphasis and the previously noted differences in inspection technique and accepted inspection practice. Further statistical analysis revealed a majority (more than 60%) of the welds rejected for undercut discrepancies to be in excess of the 1/32" allowable undercut criterion by less than 1/16". A majority (approximately 60%) of the welds found to be underrun were underrun by less than 1/2". An analysis of the attributes contained within the 'defect' category revealed only small quantities in each. Based on the above statistical analysis , the discrepancies identified in the categories of underrun, undercut and defects are not considered to be contributors to the root cause that previously accepted welds were found deficient upon reinspection.

The quantity of welds rejected that did not meet the minimum leg size as specified on the design document, or exceeded the code allowable 1/16 inch undersize for less than 10% of the length of the weld, represents a percentage of 9% deficiencies for the total welds inspected. Discussions with DIC inspection personnel and Quality Management aware of approved inspection practices utilized during the structural steel erection time frame indicated that inspection methods were similar for this period to those described in the previously addressed documentary by Reedy, Herbert, Gibbons and Associates, Inc. Of the welds identified as being undersize, more than 90% were undersize by less than 1/8", further substantiating that inspection methods were as previously described. Based on the above evaluation, the quantity of deficient welds identified as being undersize is considered an indicator that previously accepted inspection techniques was the root cause of previously accepted welds being found deficient upon reinspection.

The quantity of welds indentified during reinspection exhibiting configuration deficiencies represented 13% of all deficiencies for the total welds inspected. Of the total number of deficiencies, more than 80% were revealed by research to be directly attributable to one design change implemented in February, 1978. This Design Change Notice C0011, Rev. 7, dated February 23, 1978, changed detail 10 on drawing C0011 to limit the length of the return welds on beam clip angle to embed plate welds. The significant number of discrepancies identified in this category indicates that the design change was not given sufficient emphasis by DIC Engineering, craft, and Quality Inspection to enable deviations from this requirement to be adequately controlled. This category is the largest single contributor to "root cause" of previously accepted deficient structural welds. Bechtel, as the Architect Engineer, performed an evaluation of all welds reinspected to determine which welds were acceptable from a technical viewpoint relative to allowable stress calculations and which welds would require rework in order to meet this criterion. From this evaluation 2589 joints were determined to be technically acceptable whereas 81 required rework. These statistics, revealing that 97% of the joints reinspected were technically acceptable, are indicative that the relative degree of significance of the deficiencies identified due to reinspection is minor.

Those areas utilizing AWS D1.1 welding other than structural steel were identified as: Pipe whip restraints; miscellaneous steel and embedment fabrications; fire dampers and safety-related ductwork and supports; electrical raceway supports; electrical equipment installation; and stud welding.

Previously compiled information including Construction Self Assessment Reports, KG&E QA Reports and Surveillances, DIC QA Reports, DIC Project Monitoring Program audits, DIC Corrective Action Reports and correspondence was reviewed to determine results of previous investigations of AWS D1.1 welding. No findings were noted during this review that could be considered contributing factors to root cause. Electrical II/I support welds were reinspected by Bechtel (ELKC: 009) through the "Sampling and Inspection Program for Electrical Support Welds" (7/84). Three hundred nine (309) were inspected and found acceptable. Electrical Quality Welding Inspectors performed inspections on Class IE support welds raceway (8/82). Pipe whip restraint welds were 100% nondestructively tested. HVAC ductwork support welds were 100% reinspected through implementation of DIC Corrective Action Report CAR-1-M-0012 and a traveler system was initiated to maintain better control and accountability (3/82-1/83).

Programmatic elements utilized in the inspection and documentation of the various applications of AWS D1.1 welding differed depending upon the Quality discipline responsible for inspection activities. The following methods were utilized in the applications noted to provide inspection documentation:

a) Raceway Supports - Raceway Support Checklist

b) Electrical Equipment - Quality Equipment Mounting Checklist in addition to MSSWR's

c) Fire dampers and safety-related ductwork and supports - Mechanical Travelers

d) Miscellaneous steel and embed fabrication - MSSWR's

e) Stud welding to embeds - Surveillance Reports

f) Pipe Whip Restraints - MSSWR's in addition to Nondestructive Examination Reports

All the methods utilized above were effective in providing inspection assurance and documentation of the respective activities when properly implemented. The travelers utilized as well as the other checklists noted provided a closed loop system where individual accountability for a weld was required, controlled, and documentation verified accurate and complete by Quality personnel. Conversely Miscellaneous Structural Steel Weld Records (MSSWR's) were used in an open-ended system for Main Frame Structural Steel Installations where craft construction personnel were responsible for control, maintenance and processing of this record following its completion. This system proved less than satisfactory in some applications, resulting in document retrievability problems that have been addressed by DIC and KG&E Corrective Action Reports.

In summary the programmatic elements as described in DIC procedures for each application of AWS D1.1 welding are adequate when properly implemented by the persons responsible for those activities. MSSWR's utilized in documenting structural steel weld connections were the subject of inadequate implementation of procedural requirements, resulting in the problems being addressed in this report. The research accomplished in completion of this activity revealed no inherent "root cause" generic to all programs utilizing AWS D1.1 welding, but rather indicates that the root cause of the previous acceptance of deficient structural welds was as delineated earlier in this section.

Finding #3 to CAR-19 stated, "A small number of safety related structural steel welds were not made or had missing material."

Corrective Action 3a)

"Forward the "as-built" information to the Architect/Engineer via an NCR to obtain an engineering evaluation and disposition".

All missing welds or missing material detected in the reinspections performed were documented on nonconformance reports reflecting the as-built condition found by inspectors. Of the two thousand six hundred sixty-nine (2,669) joints reinspected (more than 11,000 welds) only two hundred seventy-three (273) welds were identified as missing where the applicable design drawing required their installation. Of the two hundred seventy-three welds not installed, one hundred twenty (120) were applicable to the polar crane girder radial stops (44%), ninety-seven (97) were due to beam seats not installed (36%), eighteen (18) were due to missing welds on six (6) pressurizer support welds (7.0%), and the remainder (38) due to missing welds on clip to beam or plate installations (13%).

Under the purview of KG&E Construction, a detailed investigation was undertaken by DIC Engineering and Management personnel to determine the root causes of missing welds and materials in each case. Significant points of that investigation included: grouping of missing welds/materials into categories to aid in research; compilation of factual data and analysis for trends/patterns; a thorough review of all applicable design change documents that may have deleted some of the items in question; visual examinations of the areas where installations should have been made; and interviews with craftsmen, craft supervision, DIC Engineering and Quality personnel for information that may have added to root causes.

Missing welds and materials were grouped into categories based on similarities that could be determined to exist in function or construction sequence. Five groups were defined, those being: beam seats and attachment welds, pressurizer support welds, Polar Crane girder radial stop welds, miscellaneous materials and associated welds, and beam to channel clip welds (for one application only). Each of these groups is discussed in detail in the following paragraphs in presenting the respective data accumulated and the conclusions drawn.

Beam seat installation welds accounted for ninety-seven (97) of the missing welds identified. Upon investigation several reasons were found as contributing factors to the root cause of failure to install beam seats as required. All beam seat connections in question were relevant to installation detail 10 on drawing C0011, which gave no required weld size, but referenced note 14. Note 14 stated, "When end reaction exceeds maximum weld size capacity provide seat angle." Discussions with personnel available who were involved with structural steel installations revealed that this note may have been incorrectly interpreted as an 'option' for beam seat installation. This resulted in a craft opinion that the beam seat was intended as a construction aid to be used only during the erection process and then removed. This contention is supported by the fact that ninety-three percent (93%) of the areas/records examined pertaining to beam seat installation revealed that the beam seats were installed prior to the beam's installation. Seventy-two percent (72%) of the embed plates investigated showed evidence of temporary welds made to attach a beam seat as a construction aid during the erection sequence, but the beam seats were not found installed upon field investigation. A majority of the beam seat associated welds missing were the beam seat to beam welds, which further indicates the questionable beam seats were tack-welded to the embed, used as a construction aid, then removed prior to welding to the beam. These above factors substantiate that the root cause of missing beam seat welds (i.e., beam seats not installed) was due to a misunderstanding of the beam seats' intended application as a permanent installation. This root cause conclusion is supported by the data accumulated and discussed in the preceding paragraphs. All missing beam seats and their respective required welds were installed as a part of KG&E and DIC Management's direction.

The missing pressurizer support welds totaled eighteen (18) welds on six (6) supports. The six (6) supports with missing welds are all of the upper supports for the pressurizer beam foundation, and all six (6) supports were found to be welded identically to each other. One inspector performed all final visual inspections of the pressurizer supports, indicating a possibility of human error being a contributor to root cause. Investigation results indicated a misinterpretation of erection details and requirements as the primary root cause of the eighteen (18) missing welds. Twenty-four (24) welds not detailed as required installations were added but not required by design drawings. The conclusion reached for root cause of the missing welds on the pressurizer supports is that DIC construction craft and Quality personnel misinterpreted the installation details and applied this misinterpretation consistently in the construction and inspection of all six supports. Nonconformance report 1SN 20509CW was generated to document these circumstances and all missing welds were installed as a part of the disposition.

The Polar Crane girder radial stops were the subject of one hundred twenty (120) missing welds. These missing welds are documented on nonconformance reports 1SN 21308CW, 1SN 21309CW, 1SN 21310CW and 1SN 21311CW. Facts gathered during the investigation of these missing welds indicate that a series of drawing revisions and misinterpretation of erection installation details resulted in DIC construction error in not making all required welds on sixty (60) radial stops. The appropriate facts are as follows:

> American Bridge Drawing E117 (C-121-8360) was revised concerning the radial stop connection. Two of the three revisions to section A were attempts to clarify the desired weld configuration at the radial stops.
>
> Revision B to American Bridge drawing E117 was produced to clarify where actual welds were expected.
>
> Revision C of Drawing E117 in part added "one side only" to the inner "C" portion of the radial stop welds.
>
> Bechtel Drawing C-OS2963 concerning the polar crane girder radial stop welds was altered at Revision 6 to note on Section A that the weld on the inner "C" indention was to be made on one side only.
>
> The MSSWR's documenting the radial stop welds made indicate erection during 2/80-3/80, before American Bridge drawing E117 clarified the installation detail on Revision E, dated 12/80.

Upon reinspection NCR #1SN 21196CW was initiated describing the deficiency in nonexistent radial stop welds. The NCR was voided in-process by the CAR-19 Inspection Supervisor due to a misinterpretation of requirements according to details on the American Bridge drawing E117, that seemed to indicate a weld installation detail requirement concurrent with the actual welds found installed during reinspection. Based upon the preceding facts, it is concluded that the root cause of missing Polar Crane girder radial stop welds is due to unclear weld detail installation requirements as projected on the American Bridge drawing E-117, and subsequent incorrect interpretation of weld installation requirements by DIC personnel.

The missing welds identified for installations involving other miscellaneous materials and welds missing are of a smaller quantity. Thorough investigation revealed the root cause of these missing welds to be due to a lack of formal follow-up and inadequate statuses of completed work and the subsequent completion of unfinished work. The missing welds on the Incore tubing supports revealed that all investigatory information supports the hypothesis that these missing welds were not installed due to oversite. The four lateral support brackets, two at each of the vertical angle supports (Incore tubing supports) located 32' - 2 3/4" north of the Reactor Center Line and 4' 10" east and west (one each direction) of Reactor Center Line on Drawing GOS2919 were added by revision to drawing GOS2924 after the supports had been presumed completed.

Nonconformance report 1SN 21273CW documents missing welds on channel clips to beam attachments. The channels that American Bridge Drawing #C121-10675 shows welded to a beam web along A2 at Elevation 2042' are bolted instead. The channel clips are bolted to the web using the same bolts as removable beams on the opposite side of the web. Research found that the installation of the channel and removable beam was late in the construction sequence of this area, also. Since the channel clips and removable beam clips are bolted through a beam web with the same bolts, the channel clip attachment welds were probably assumed to be unnecessary by the construction personnel responsible for installation.

If the removable beams had been disconnected for the purpose of construction, it would have become necessary to weld the channel clips to the beam web at that time. The beams and channel in question were installed late in the construction sequence of the area, removal of the beams never became mandatory, the welds were not a recognized priority and were never installed as required. The root cause of these missing welds is due to DIC error in assuming the bolted connections were acceptable rather than the required welds. In the miscellaneous group, investigations revealed that welds or material found missing were those welds or materials that would not impede construction progress related to that connection.

Finding #4 to CAR-19 stated, "One (1) weld was documented as having been inspected when in reality the weld was not made. (Ref. NCR 1SN 20495CW)."

Corrective Action 4a)

"Investigate the concern to determine the root cause of the error. Immediately notify KG&E Quality Assurance if any other problems of this nature are identified. Document the investigative actions. The notification of KG&E QA shall not preclude the issuance of an NCR."

The results of the CAR-19 inspection effort were tracked and each case where a missing weld or missing material was identified was researched thoroughly by DIC Engineering to determine whether documentation existed pertinent to the installation of the missing weld/material. Miscellaneous Structural Steel Weld Records (MSSWR's) were reviewed to determine if a trend or pattern existed. Nonconformance reports identifying missing welds were compared to MSSWR's to determine if there were repetitive occurrences.

Applicable drawings were reviewed for similarities in beam numbers, floor layout and beams at similar locations in an attempt to further identify possible sources of confusion. As a result of the investigations conducted only two (2) cases were identified where inspection documentation existed for welds not installed.

The first case is the installation of beam No. 524B2 and its connection to an embed in the Auxiliary Building. All available information indicates that DIC Quality Inspector W made a human error when documenting the inspection of this beam connection. A review of the drawings shows that the beam configuration and floor layout in the area (elevator shaft and equipment hatch) directly beneath the beam connection in question are very similar. In addition, the beam below beam 524B2 connects at the same building coordinates.

It is possible that Inspector W could have been one elevation beneath where he should have been when inspecting the connection. Out of the multiple welds inspected by Inspector W this problem occurred only once. If actions which would result in other conclusions had occurred, it would be reasonable to assume that they would have occurred repeatedly. Inspector W's signature appears on over eight hundred (800) MSSWR's. Each MSSWR could document multiple weld inspections, therefore, Inspector W very likely inspected over one thousand (1,000) structural steel welds, with the result that this type of problem occurred once. A telephone conversation between Inspector W and DIC management personnel concerning this incident revealed no information that Inspector W could offer, since he could not recall the specific connection from the more than eight hundred (800) he inspected. The root cause conclusion in this case is human error.

The second case is the installation of beam No. 95B5 to an embed in the Control Building. All available information suggests that DIC Quality Inspector X made a human error when documenting the inspection of this beam connection. The MSSWR documenting this connection shows Inspector X's confusion in that he entered the joint number incorrectly when filling out this portion of the MSSWR, then lined through, initialed and dated his error, and entered what he thought was a correct entry. Drawing K6711-XI-I-E13 details this connection, but is unclear in that it does not designate the connection number for the beam clip to embed weld, and only lists the beam seat number (91M1).

Further research revealed that Inspector X completed one hundred eighty-three (183) MSSWR's during his tenure on site, but only six (6) of these MSSWR's were related to structural steel weld inspections. This is indicative that Inspector X was possibly confused by the details on the erection drawing. It is probable that Inspector X attempted to document the welds attaching the beam clips to beam 95B5, since no retrievable MSSWR is on file for these welds. These circumstances are documented on nonconformance report 1SN 20798CW for disposition and resolution. The root cause conclusion in this case is human error.

Finding #5 of CAR-19 stated, "Objective evidence that the mechanical and structural inspection/documentation problems identified in KG&E QA Surveillance Report S-372 were rectified has not been provided."

Corrective Action 5a)

"Provide objective evidence that the mechanical and structural support welding inspection/documentation problems identified in Surveillance Report S-372 have been corrected. If such evidence is not available, research the extent of the problem and take the appropriate remedial actions." Activity 5a was broken down into two categories. 5a-1 was to review and provide objective evidence that Mechanical Deficiency Reports identified in S-372 have been correctly closed out. 5a-2 was to review and provide objective evidence that Civil Deficiency Reports identified in S-372 have been correctly closed out.

A total of forty-two deficiency reports were reviewed encompassing the departments of Civil, Civil/Welding, Mechanical, and Mechanical/Welding which are identified in S-372. Below is a brief description of the closure to each Deficiency Report (DR). (Deficiency Reports underlined.)

1. 6451 was upgraded to an NCR (1NN 4969CW) because all welds were encapsulated in concrete and deemed structurally acceptable by the A/E.

2. 6536 and 6538 were "Close in Process" because the hangers were "VOIDED"; hangers were removed mechanically, and Quality inspected the area to insure soundness of the affected structure.

3. 6559, 6557, 6560, 6568 pertained to electrical raceway hangers. DIC Mechanical/Welding inspectors performed inspections to ensure the soundness of the removal area after cut down, according to DR disposition. The reinstallation of these hangers was inspected by DIC Electrical Quality Inspectors and documented on Electrical Quality Raceway Support Checklists.

4. 6535, 6537, 6539, 6576, 6575, had dispositions calling for cut down of hangers only, therefore only the verification for the inspection of the soundness of the removal area was required.

5. 6585 disposition was "Close in Process" because no hanger could be located in the area called for by the Deficiency Report. The two closest hangers have the required documentation and their respective documentation is attached to the Deficiency Report.

6. 6249, 6250, and 6349 have MSSWR's to reflect proper closure, but the hangers are now voided. Based on this research an inspection of the applicable Building, Location, and Area (BLA) for these hangers was initiated and the hangers were verified as cut down.

7. The remaining Deficiency Reports have MSSWR's attached to reflect the proper documentation for the safety-related attachment welds. This group of Deficiency Reports numbers 26 total.

No violations of 10 CFR 50 Appendix B exist in Items 1 thru 5 as defined in the criteria of KG&E Surveillance S-372. The violations listed in S-372 pertained to welding documentation on Structural Steel. The dispositions for the deficiency reports in items 2 thru 4 require the removal of deficient welds. In some cases MSSWR's were used to document the removal so these MSSWR's show blanks (or as non-applicable) for W-100, weld technique, filler material, etc. These should not be mistaken for incomplete MSSWR's for required welding, since MSSWR's are not required for this activity.

In summary, all deficiency reports in KG&E Surveillance S-372, have been reviewed and proper closure verified. All the deficiency reports were closed properly according to the results of our investigation.

DEFICIENCY REPORT #

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V. Conclusions

The technical evaluation of WCGS structural steel significant joints, which was performed by Bechtel based upon reinspection data accumulated, established that safety related AWS D1.1 structural steel welding complies with all Quality criteria as specified in the related design documents, and is within the tolerances of acceptable deviation as determined by the Architect/Engineer. This evaluation for structural integrity was based upon this cumulative data that reflected the as-built condition of Bechtel identified structurally significant joints prior to any rework or repairs.

Two thousand six hundred sixty-nine (2,669) structurally significant joints were identified by Bechtel and were subsequently reinspected by DIC Certified Quality Inspectors who were all also AWS certified Welding Inspectors. Eighty one (81) of these significant joints required rework due to design allowable stresses being exceeded in the as-built condition. None of the structurally significant joints where discrepancies were identified would have failed if left uncorrected.

Research accomplished by DIC and Bechtel personnel substantiated that all DIC welders and welding procedures applicable to AWS D1.1-1975 welding of structural steel installations were qualified in accordance with AWS requirements. Additional research resulted in assurance that programs and procedures applicable to the purchase and control of weld filler materials used in AWS D1.1 applications were in compliance to AWS requirements. Investigations into site implementation of these requirements and procedures provided assurance that implementation had been effective and properly controlled by DIC during project construction activities.

The retrievability and control of Miscellaneous Structural Steel Weld Records (MSSWR's) was investigated, and a determination made that inadequate implementation of DIC construction procedures was a contributing factor to retrievability and accountability problems with MSSWR's relative to structural steel applications. Thorough analysis of each applicable program was undertaken by DIC Quality Engineerning to determine if similar programmatic or procedural requirements existed, and whether inadequate implementation had resulted in similar deficiencies. The results of these assessments determined that no programmatic problems existed in any other AWS D1.1 application relative to inspection documentation required for weld inspections. Evaluations of each application identified that more efficient documentation methods were utilized, and in each case there was more effective control of the required documentation through its initiation and processing cycles. Review of Quality Assurance historical audits and surveillances and an evaluation of procedural implementation adequacy further assured no problems existed in any other AWS D1.1 application similar to the MSSWR retrievability problem on structural steel welding.

Hardware applications of AWS D1.1-1975 requirements were also analyzed to determine if the root causes applicable to the previous acceptance of deficient structural steel welds were of potential impact in applications other than structural steel. Reinspection and Corrective Action reports existed in every case to ensure the acceptability of installed hardware where AWS D1.1 welding was utilized except in Electrical Equipment foundation welds. DIC Management determined that a subsequent investigatory effort was necessary to provide data to ascertain the possible existence of deficiencies in welding and shimming in these installations. DIC Corrective Action Report 1-EW-0046 was initiated to document and accomplish these activities.

DIC Corrective Action Reports (CAR) 1-W-0029 and 1-C-0031 were evaluated to determine why neither of these documents resulted in the appropriate identification and effective resolution of structural steel welding and documentation problems prior to KG&E Corrective Action Request 19. CAR 1-W-0029 was found to be effective for the scope of welds identified. A conclusion was reached, however, that if a larger sample size had been utilized for CAR 1-W-0029's scope of inspection activities, that corrective action concurrent with that identified for KG&E CAR-19 may have been decided appropriate as resolution for the identified problems.

With the generation of DIC CAR 1-C-0031 DIC Management recognized that documentation did not exist for all structural steel welds as procedurally required, and nonconformance reports were generated to document these inadequacies. 'Use-As-Is' dispositions were assigned to these nonconformance reports based upon the existence of defined programs and procedures that required 100% inspection and documentation of structural steel welding activities. An assumption was made that although required documentation was not 100% retrievable, the programs in place during structural steel installation/inspection activities did result in all installations being completed and inspected.

Neither CAR 1-W-0029 nor CAR 1-C-0031 required matching of MSSWR's to structural steel welds or welded connections. If this had been a required corrective action for either CAR, the problems identified in portions of KG&E CAR-19 would have been realized.

The findings addressed in CAR-19 in addition to missing MSSWR's included deficiencies identified in previously accepted structural steel welds, missing structural welds or missing structural material, and documentation that a weld was inspected and accepted, but no weld was installed.

An evaluation of the DIC Quality inspection training program demonstrated that this program and related procedures were in compliance to ANSI N45.2.6. Further investigation concluded that Quality inspection training was appropriate and adequate during the structural steel installation time frame. An evaluation of DIC Quality inspection procedures and criteria applicable to the original structural steel installation/inspection period revealed several procedural inadequacies. A thorough analysis of the omission of each inspection criterion of AWS D1.1 structural steel applications was accomplished, with the conclusion that no adverse impact had resulted from these procedural inadequacies relative to AWS D1.1 welding inspection.

Inspection criteria to be used in the structural steel reinspection activities was procedurally defined and training of all personnel completed prior to reinspection initiation. Sufficient technical justification was established by Bechtel to validate inspection of welds through a predetermined maximum thickness of paint. An analysis of reinspection results determined the root cause of the previous acceptance of deficient structural welds to be due to DIC inspection implementation differences relative to inspection vs. reinspection techniques, and inadequate implementation of applicable DIC procedures.

Two (2) of the welds on joints reinspected were initially thought to be documented as being installed when in reality they were not installed. Research revealed no evidence to indicate that either was a case of deliberate falsification. Additional investigations resulted in a conclusion that human error was the cause of incorrectly documenting these nonexistent installations.

Reinspection found that some welds and materials were not installed as required by design documents. These errors were primarily due to craft/engineering errors relative to misunderstanding of installation drawing details and requirements. Failure to install these welds and materials, although in some cases determined to be significant in impact to design stress allowable calculations, would not have resulted in material or structural failure if left uncorrected. All missing welds will be installed in accordance with a KG&E Management directive.

As a result of those concerns identified in KG&E CAR-19, DIC conducted an assessment of the programmatic aspects of the Piping, Hanger, Mechanical, Electrical and Civil disciplines to ascertain the adequacy of those programs instituted in the construction of Wolf Creek Generating Station. Other than the concern identified in DIC CAR 1-EW-0046 the program assessment has established a high degree of confidence in the adequacy of the overall DIC Construction program to assure compliance with 10CFR50, ANSI N45.2, FSAR, design and procedural requirements. The cause of the adverse conditions identified in KG&E CAR-19 and DIC CAR 1-EW-0046 is limited to these areas in that all other areas of work which would have been rendered inadequate or suspect due to the identified root cause have been adequately addressed through subsequent means such as retrofit or reinspection programs.

After completion of the program assessment, which addresses all aspects of the DIC Construction programs in total, and as they might have been affected by the identified root cause of deficient structural steel welds, it is the conclusion of this assessment that all significant problems have been identified and are being adequately addressed and resolved through appropriate corrective actions.

This program assessment is included in the Appendix, section VI.H of the KG&E CAR-19 Final Report, and has concluded that a satisfactory level of confidence exists to assure compliance with 10CFR50, ANSI N45.2, the FSAR, and Design and Procedural requirements.

The objective of KG&E CAR-19 was to establish by review of Construction and Quality programs, as-built conditions, nonconformance identification and correction and by design evaluation and/or rework, that all structural steel erection commitments in the Wolf Creek Final Safety Analysis Report were satisfied. Through the cumulative efforts in the resolution of CAR-19 assurance was obtained that all significant Quality criteria as specified in the related design documents were satisfied, within the tolerances of acceptable deviations as determined by the Architect/Engineer.

FORM 1177 REV 1-67

KGE

INTEROFFICE CORRESPONDENCE

TO: G.L. Fouts

KGLRWC 84-002

FROM: R.M. Grant

DATE: October 17, 1984

SUBJECT: Corrective Action Request (CAR) No. 19

Attached is Corrective Action Request (CAR) #19 which is being issued to obtain corrective actions to problems associated with safety-related AWS D1.1 structural steel welding.

Please respond to this Corrective Action Request by completing Section 5 of the subject CAR. Your schedule for implementing corrective actions and an explanation of any actions you have already taken should be submitted to me by October 24, 1984.

RMG/dkb

cc: K.R. Brown
G.L. Koester
F.J. Duddy
W.J. Rudolph II
C.E. Parry
C.G. Patrick

KCF-60 Rev. 2/84

IE 52501

WOLF CREEK GENERATING STATION

CORRECTIVE ACTION REQUEST

CAR NO. 19

1. CONDITION DESCRIPTION:

See Attached.

2. RESPONSIBLE ORGANIZATION:

KG&E Construction

3. CAUSE OF CONDITION:

QA Program breakdown associated with safety-related AWS D1.1 structural steel welding.

4. RECOMMENDED CORRECTIVE ACTION:

See Attached.

10-17-84

Reviewer Date

10-17-84

Quality Branch Representative Date

5. SCHEDULE FOR IMPLEMENTATION OF ACTION:

Responsible Supervisor Date

6. NRC REPORTABLE: [✓ Yes] No
9/18/84 See Attached Telephone Call Record

7. STOP WORK ACTION TAKEN: Yes [✓ No]
If Yes, Report #________

8. CORRECTIVE ACTION VERIFIED - Method of Verification:

Quality Branch Representative Date Supervisor Date

9. CAR CLOSED: Yes

Quality Branch Representative Date Supervisor Date

10. APPROVAL ____________________ DATE ____________
Director - Quality

I. CONDITION DESCRIPTION

A. Objectives

- To document a consolidated project plan for the identification, evaluation and resolution of problems associated with Safety-Related AWS D1.1 Welding.
- To provide assurance, based on objective evidence, that AWS D1.1 Welding of Safety-Related Structural Steel complies with all Quality Criteria as specificed in the related design documents and is within the tolerances of acceptable deviations as determined by the Architect - Engineer.
- To provide assurance that the documentation which supports the inspection of safety related structural steel welds is:
  - Available
  - Complete
  - Reflects appropriate information
  - Traceable to the item or activity
- To evaluate supporting elements of the DIC Quality Assurance Program to ensure that those elements were adequately and effectively implemented to demonstrate that the DIC welding of safety related structural steel, HVAC Supports, Electrical Supports, Pipe Whip Restraints and any other AWS D1.1 safety related welding activities were in compliance with the FSAR (i.e. AWS D1.1 - 1975) and the Design and Construction QA Program Manual, Section 17.1.B.

B. Definitions

Joint - A structural steel welded connection. A joint may consist of numerous welds. A joint may also be referred to as a connection.

Weld - A continuous length of weld material with only one start and one stop.

MSSWR - Miscellaneous Structural Steel Weld Record; a form used by DIC to document installation and inspection data for welds made to structural steel.

AWS D1.1 - American Welding Society's Structural Welding Code. This code covers welding requirements applicable to welded structures. It is to be used in conjunction with any complementary code or specification for the design and construction of steel structures.

Miscellaneous Structural Steel - See Attachment B for Complete Definition.

Structurally Significant Welds - See Attachment B for Complete Definition.

C. Background Information

- KG&E Surveillance Report S-372 (October, 1981) identified a Quality Program breakdown due to the following deficiencies:

  - Missing inspection documentation
  - Incomplete/improper resolution of identified electrical, mechanical and structural weld documentation deficiencies.

  The Surveillance Report resulted in the issuance of DIC CAR #9. CAR #9 pertained exclusively to the major finding of the Surveillance Report, that being electrical support weld inspection documentation. An agreement between KG&E and DIC Quality Management was reached that required KG&E to issue a CAR if the DIC resolution was unsatisfactory to KG&E.

- DIC CAR No. 1-E-009 (October, 1981) was subsequently issued to address the electrical support weld inspection documentation concerns identified in the KG&E Surveillance Report. The root causes of the problems identified in the KG&E Surveillance Report were determined by DIC to be:

  - The lack of notification by the responsible craft to Quality inspectors that welding activity was scheduled to commence.
  - Improper processing and filing of weld records.
  - The existance of a single part document as opposed to a triplicate type form to record inspections.

  The corrective measures taken by DIC involved the retraining of construction engineering personnel and the placement of limitations on the authorization level required to initiate the dispositions to Deficiency Reports. The CAR was closed in November, 1982.

- DIC CAR 1-W-0029 (March, 1983) was initiated to address some weld inspection inconsistancies in the Auxiliary, Control and Fuel Buildings. To investigate the extent of the problem 241 welds were inspected of which 147 were identified by the inspectors as deficient. To resolve the condition identified on the CAR, NCR 1SN10381PW was generated. The evaluation of the NCR involved another inspection by Welding Engineering which resulted in the determination that only 22 welds exhibited potentially significant conditions and were subsequently evaluated by the Architect - Engineer and dispositioned "use-as-is". Based on the NCR and its closure, DIC closed CAR 1-W-0029 in October, 1983.

- DIC CAR 1-C-0031 (August, 1983) states in part:

  > "MSSWRs used to document safety related structural steel welded connections through out "Q" designated areas is inadequate. A sample survey made by (DIC) Q.E. has shown 16.4% of the required MSSWRs cannot be located for all "Q" welds in the Fuel Bldg. A survey of 6 erection/design drawings in the Reactor Bldg revealed 24% of the welds are missing documentation. In addition, M/W Quality has initiated a NCR (1SN11957CW) to document 42 missing MSSWRs for welds in the ESWS Pumphouse."

The CAR was dispositioned to write an NCR for each safety related building to address the missing MSSWR's. Although the CAR remains open, the proposed justification for closure is based in part on the closure of DIC CAR 1-W-0029.

- Current Project Actions
  - Document Reconciliation Task: On August 13, 1984, a document reconciliation effort was initiated at the direction of project management to determine which safety related structural steel welds identified on design drawings were lacking inspection documentation in the form of MSSWRs.
  - Inspection Verification Plan: On August 17, 1984, an inspection verification effort was initiated at the direction of project management to provide an accurate assessment of the "as-built" conditions of safety related strucutral steel welded connections with unretrievable MSSWR's. These activities are being performed by a combined team of DIC and Architect - Engineer AWS Certified Welding Inspectors under direct supervision of KG&E Construction QC. These activities are being performed in accordance with written instructions issued by KG&E Construction QC which reflect the criteria of AWS D1.1-1975 and the applicable Architect - Engineer design documents. The results of these verifications and the review of Surveillance Report S-372 have caused the findings in Section E of this report to be issued.

D. Requirements

The welding of safety related structural steel connections at WCGS is governed by welding code AWS D1.1-1975. The WCGS FSAR invokes this code for each safety related structure. In addition, SNUPPS project specification 10466-C-122 (Q) Rev. 0 through 14 entitled "Technical Specification for Contract for Erection of Structural Steel for the (SNUPPS) Power Plant" and specification 10466-C-132(Q), Rev. 0 through 8 titled "Technical Specification for Erecting Miscellaneous Metal for the Standardized Nuclear Unit Power Plant System (SNUPPS)" requires structural steel welds to be performed in accordance with AWS D1.1-1975, with exceptions in the criteria for undercut (para. 8.5.2) and weld convexity (para. 8.5.3).

E. Findings - Impacts - Recommended Corrective Actions

The five findings listed below were identified during the two WCGS management assessments described in the 'Background Information' section of this report and a review of Surveillance Report S-372 by KG&E CA. Collectively, these represent a breakdown of the constructor's Quality Assurance program. This condition was caused by an apparent inconsistent application of weld inspection criteria, failure to implement procedural requirements for documenting inspections, and failure to implement effective corrective actions for identified deficiencies.

Finding #1: **The results of the Document Reconciliation Task indicated that 1539 of 6816 MSSWRs for safety related structural steel welds are missing.** (See Attachment B)

Impact: Without the documentation for the structural welds, the following areas are indeterminate:

- Welder identification and qualification
- Filler metal traceability
- Visual inspection results
- Qualified weld procedures specification used

Recommended Corrective Actions: Actions 1a through 1h below will adequately address all of the concerns identified in Finding #1 and the "root cause" concerns associated with Finding #2.

1a. Based on DIC program requirements, assure that all of the welders and welding procedure specifications were qualified to AWS D1.1 - 1975.

1b. Review the DIC program for the purchase and control of filler material to ensure that only acceptable filler material was used in safety related structural steel welds.

1c. Evaluate the adequacy of the DIC inspection criteria and procedures to determine if these elements could have adversely impacted either the results of the initial inspections or the results of the verification plan. Document and provide this evaluation to KG&E QA for review prior to any additional inspection implementation. Any changes in inspection criteria and procedures shall be provided to KG&E QA for review.

1d. Obtain a documented evaluation to determine the validity of inspections performed with the presence of paint on the weld.

1e. Utilize personnel certified to ANSI N45.2.6 - 1978 for the inspection of safety-related structural steel welds. Inspections shall be performed in accordance with the DIC Quality Program and training shall be performed and documented to assure that inspectors are cognizant of the DIC Quality Inspection program requirements.

1f. Perform a 100% reinspection of all structurally significant safety-related structural steel welds with missing MSSWR's. The identification of "structurally significant" welds shall be made by the Architect - Engineer (See Attachment B). Inspect the welds per recommendations 1c, 1d, 1e, 1g, 1h and 2a.

1g. Use an NCR to obtain and document a suitability for service evaluation of inaccessable welds.

1h. Report all identified deficiencies on an NCR.

* *

Finding #2: An inspection verification effort of safety-related structural steel welding, undertaken by AWS certifed weld inspectors identified several areas of deficiencies. These deficiencies have been catagorized below:

- Undersized welds
- Weld defects
- Incorrect configuration
- Weld underrun
- Weld undercut

Impact: These deficiencies could jeopardize the structural integrity of the connection.

Recommended Corrective Actions: Actions 2a through 2d below will adequately address all of the concerns identified in Finding #2 and the investigative actions required by Finding #5.

2a. Determine and document the "root cause" of the previous acceptance of deficient structural welds. Analyze the HVAC Support, Electrical Support, Pipe-Whip Restraint and any other safety-related program utilizing AWS D1.1 Welding to ensure that the same "root causes" inherent in the structural steel welding program were not generic to other programs.

2b. Perform a 100% reinspection of all structurally significant safety-related structural steel welds having MSSWR's. The identification of "structurally significant" welds shall be made by the Architect - Engineer (See Attachment B). Inspect the welds per recommendations 1c, 1d, 1e, 1g, 1h, and 2a.

2c. Evaluate the results of the completed Inspection Verification Plan against the acceptance criteria used in Action 1c.

2d. Any identified deficiencies shall be documented on an NCR.

* *

Finding #3: A small number of safety-related structural steel welds were not made or had missing material.

Impact: The structural integrity has possibly been jeopardized.

Recommended Corrective Action: The following action and the engineering disposition will adequately address Finding #3.

3a. Forward the "as-built" information to the Architect - Engineer via an NCR to obtain an engineering evaluation and disposition.

* *

Finding #4: **One (1) weld was documented as having been inspected when in reality the weld was not made. (Ref. NCR 1SN28495CW)**

Impact: The inspector who made the error could have improperly documented other welds. The structural integrity has possibly been jeopardized.

Recommended Corrective Action: The following action will adequately address Finding #4.

4a. Investigate the concern to determine the root cause of the error. Immediately notify KG&E Quality Assurance if any other problems of this nature are identified. Document the investigative actions. The notification of KG&E QA shall not preclude the issuance of an NCR.

* *

Finding #5: **Objective evidence that the mechanical and structural welding inspection/documentation problems identified in KG&E QA Surveillance Report S-372 were rectified has not been provided.**

Impact: There is a possibility that the mechanical and structural support welding inspection/documentation problems identified in the Surveillance Report were not corrected.

Recommended Corrective Action: The following action will adequately address Finding #5.

5a. Provide objective evidence that the mechanical and structural support welding inspection/documentation problems identified in Surveillance Report S-372 have been corrected. If such evidence is not available, research the extent of the problem and take the appropriate remedial actions.

F. Recommended Corrective Action Flow Diagrams

See Attachment C.

MANAGEMENT PLAN FOR THE RESOLUTION OF CAR-19

Overview

The objectives of this plan are as delineated in CAR-19. These objectives will be met by providing objective evidence that each of the corrective actions specified within CAR-19 are satisfactorily implemented. The intent is to verify that both the hardware and programmatic aspects of all safety related activities utilizing AWS D1.1 welding are in compliance with the FSAR (i.e. AWS D1.1 - 1975) and the Design and Construction Program Manual (Section 17.1B).

The attached logic chart illustrates the approach to be used in providing the above mentioned verifications. The Corrective Actions associated with each of the steps on the logic chart are identified on the chart.

All Corrective Actions shall be implemented in strict accordance with CAR-19 including review and approval of specific items by KG&E QA where requested. Flow diagrams (attachments C-1 and C-2 of the CAR) have been and will continue to be considered in developing corrective actions.

Upon completion of each of the corrective actions necessary to resolve CAR-19, reports will be prepared which summarize action taken. These summary reports will be used internally by DIC in the preparation of evaluations which will be submitted to KG&E to be used in the preparation of a final report.

Findings and Corrective Actions

The following pages include the Findings and Corrective Actions as presented in the subject CAR. The detailed activities required to implement each Corrective Action are listed beneath the Corrective

Actions. The numbering system for findings and corrective actions used in CAR-19 correspond directly with those used herein. Responsible key personnel are also provided.

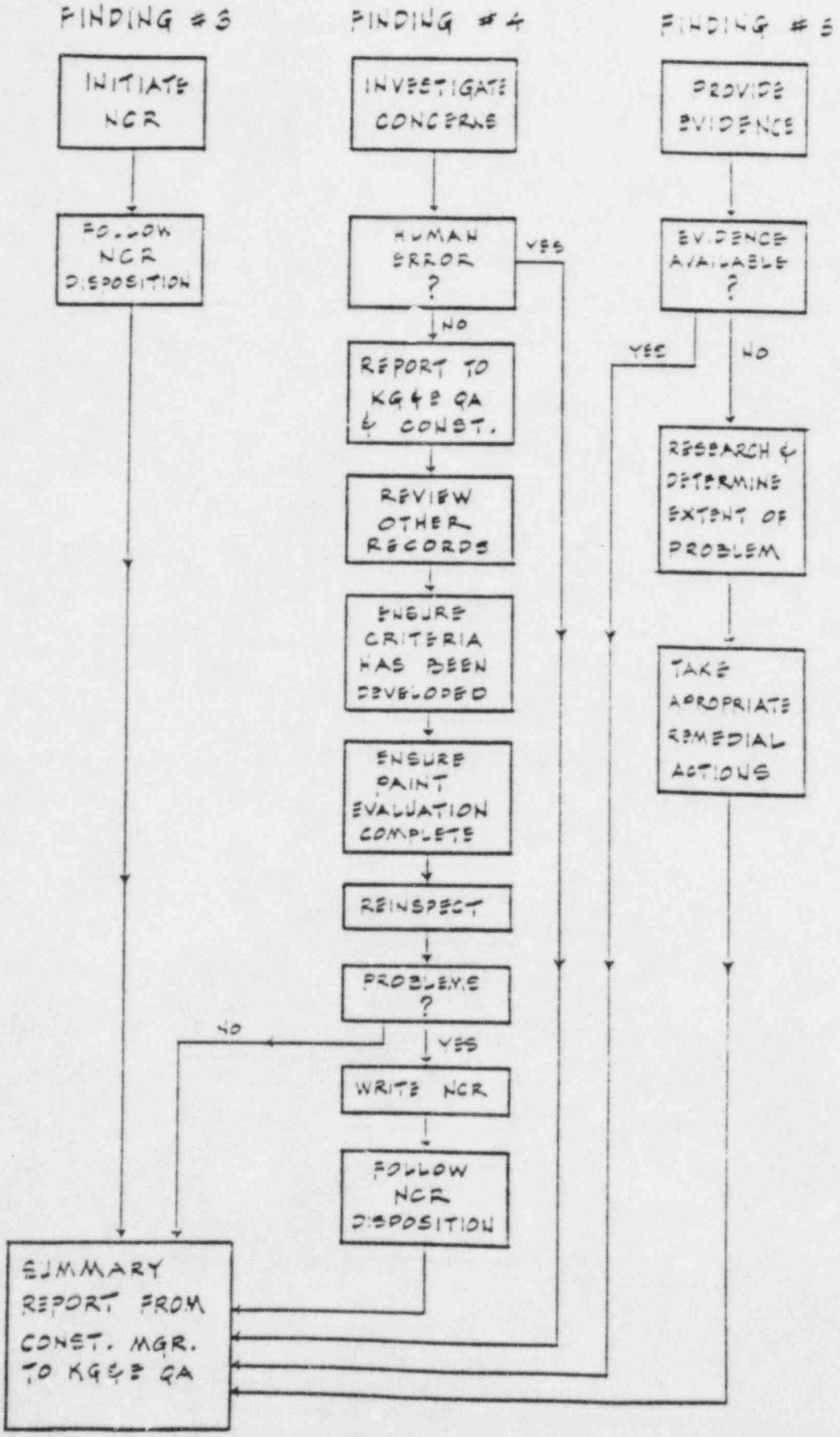
ATTACHMENT (2)

KG&E MANAGEMENT PLAN

NOVEMBER 14, 1984 (Revision 1)

KG&E CAR 19 ATTACHMENT C-2

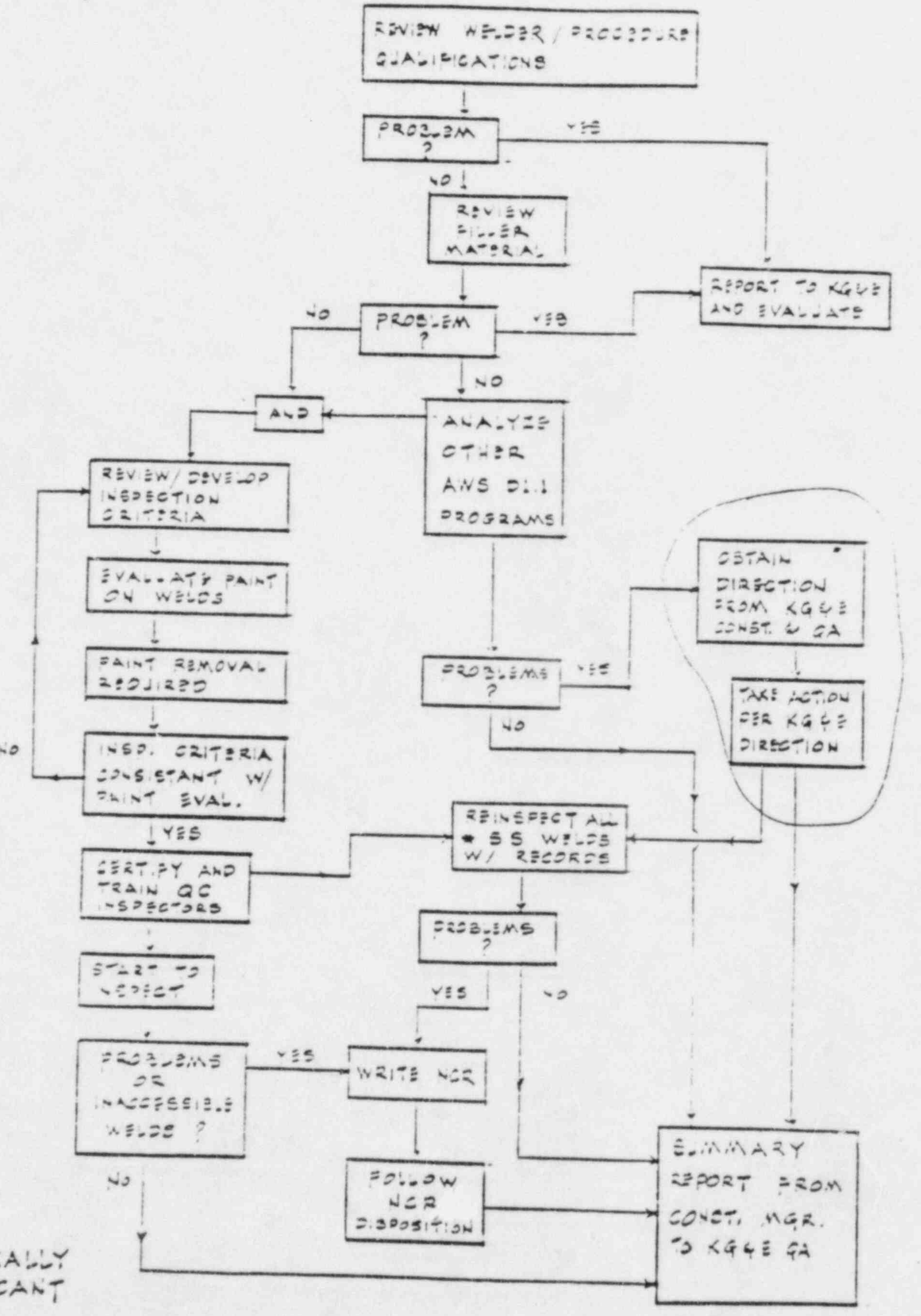
RECOMMENDED CORRECTIVE ACTION FLOW DIAGRAM



KG&E CAR 19 ATTACHMENT C-1

RECOMMENDED CORRECTIVE ACTION FLOW DIAGRAM

FINDING #1 & 2



* = STRUCTURALLY SIGNIFICANT

ATTACHMENT B

1. **Definition of Miscellaneous Structural Steel:**

   Miscellaneous Structural Steel is divided into two (2) parts for the purposes of this CAR.

   A. **Main Frame and Associated Members:**

      Main frame welds are those welds on structural steel connections which support the main building floors (concrete or grating) and roofs. For efficiency, these connections are identified on a "per drawing" basis rather than categorizing each piece of steel individually. Therefore, it is inevitable that this category will include certain "associated" connections, such as, welds other than those which support main building floors and roof, which are depicted on drawings primarily showing main building floor and roof steel.

   B. **Miscellaneous:**

      Miscellaneous welds connect steel which does not support main building floors or roofs (i.e., all structural steel welds not classified as main frame or associated welds). This does not include hand-rails, toe-plates, and similar items.

2. **Definition of Structurally Significant Welds:**

   Those welds which are required in the completed building structure to support and protect safety related equipment and building components. Welds for temporary supports, non-safety related supports, hand-rails, toe-plates, and similar items are not considered to be structurally significant by this definition.

ATTACHMENT A

DATE: 9/19/84

TIME: 3:00

LE: KSLNRC

TE: 40675-K152

TE: 83564-152

TELEPHONE CALL RECORD

TO: Lawrence Martin

FROM: OMaynard, BRudolph,
MLindsay, CParry

COMPANY: NRC-Region IV

ADDRESS: Arlington, Texas

TELEPHONE NO.: 817/860-8100

SUBJECT: Potential 10CFR50.55(e) Inspection of Welds. (use ink)

We informed Mr. Martin that during our re-inspection of welds for which we had no inspection records, we identified 4 welds on the containment cooler platfrom and 4 lateral supports for the incore instrumentation tubing that were not installed. We are investigating to determine whether or not the condition was documented and why they had not been installed.

RECEIVED
SEP 20 1984
QA

ACTION REQUIRED AND DATE: Licensing coordinate 30-day report - due: 10/18/84

DISTRIBUTION:
F Rhodes
M Williams
R Hagan
M Johnson
G Rathbun
L Stevens
F Field
G Koester
F Duddy
G Fouts
R Grant
W Rudolph
R Glover
G Baker
B Meyer
H Bundy/B Bartlett/W Guldemond
R Pogue/F Zaval
C Parry/M Lindsay
J Bailey/D Prichard
A Beat
S Seiken

(signature)

Finding #1: "The results of the Document Reconciliation Task Force indicated that 1509 of 6816 MSSWR's for Safety Related Structural Steel Welds are missing."

RESPONSIBILITY

1a) "Based on DIC program requirements assure that all of the welders and welding procedures were qualified to AWS D1.1."

K. Hollingsworth
B. Newton

1a-1 DIC develop AWS D1.1 attribute checklist and review welding procedure and welder qualification procedure against this checklist; include documentation of procedure review cycle.

K. Hollingsworth
B. Newton

1a-2 DIC perform statistical sampling plan in accordance with MIL-STD-105D to verify qualifications of welders appearing on randomly selected MSSWR's.

G. Stanley
M. Pitre

1a-3 Bechtel review and comment on DIC Welding Procedure Specification and Welder Qualification Procedure as to compliance to AWS D1.1.

D. Mauldin

1a-4 Provide report summarizing the results of the above.

1b) "Review the DIC program for the purchase and control of filler material to ensure that only acceptable filler material was used in safety related welds. Assure that both safety related and non-safety related filler materials were properly controlled to preclude improper application."

K. Hollingsworth B. Newton	1b-1	DIC review procedures for the purchase and control of filler and base materials and prepare description/justification.
G. Stanley	1b-2	Bechtel review procedures for the purchase and control of filler materials and comment.
D. Mauldin	1b-3	Prepare summary report.
	1c)	"Evaluate the adequacy of the DIC inspection criteria and procedures to determine if these elements could have adversely impacted the inspection results. Document and provide this evaluation to KG&E QA for review prior to inspection implementation. Any changes in inspection criteria and procedures shall be provided to KG&E QA for review prior to implementation.
D. Mauldin J. Ayres	1c-1	Develop AWS and site specification attribute checklist related to inspection requirements. Review DIC inspection criteria and procedures in accordance with checklists.
J. Ayres	1c-2.0	Document this evaluation.
J. Ayres	1c-2.1	Summarize results of 1c-2.0 and provide results to KG&E QA.
J. Ayres	1c-2.2	Continue further actions as a result of 1c-2.0 evaluations.
J. Ayres	1c-3.0	Discuss evaluation with KG&E QA.
D. Pigdon T. Halecki	1c-3.1	KG&E QA provide input/comment on evaluation of 1c-3.0 to DIC.
J. Ayres	1c-4	Prepare changes/revisions as necessary and submit to KG&E QA for review.

D. Mauldin J. Ayres	1c-5	Prepare summary report items 1c-1 through 1c-4.
L. Pardi	1d)	"Obtain a documented evaluation to determine the validity of inspections performed with the presence of paint on the weld."
K. Hollingsworth B. Newton	1d-1	Obtain information from other utility/AE's that have developed a validation plan.
B. Newton G. Brown	1d-2	DIC Welding Engineering and Bechtel Review; add site specific requirements/justification as necessary and develop site position letter.
G. Stanley	1d-3	Submit letter to KG&E for review and approval.
D. Mauldin	1d-4	Prepare summary report items 1d-1 through 1d-3.
	1e)	"Utilize personnel certified to ANSI N45.2.6 - 1978 for the inspection of safety related structural steel welds. Inspections shall be performed in accordance with the DIC Quality Program and training shall be performed and documented to assure that inspectors are cognizant of the DIC Quality program requirements."
D. Mauldin	1e-1	Incorporate CAR-19 Inspection Verification Plan into DIC procedure QCP-VII-200, "Inspection of Welding Process."
W. G. Westhoff J. Fletcher	1e-2	Inspection personnel to be certified to ANSI N45.2.6 - 1978 in accordance with DIC certification program based on education and experience levels.

L. Easterwood
J. Fletcher

1e-3 Site specific qualifications will be limited to the re-inspection of structural steel welds in accordance with the requirements of QCP-VII-200.

D. Mauldin

1e-4 Prepare summary report items 1e-1 through 1e-3.

1f) "Perform a 100% reinspection of all structurally significant safety related structural steel welds. The identification of "structurally significant" welds shall be made by the Architect - Engineer."

G. Brown
J. Fletcher

1f-1 Identification of "structurally significant" welds by the Architect - Engineer.

"Structurally significant" joints are defined as all field welded joints which support or potentially support safety related equipment and building components. This basically includes all field welds on structural and miscellaneous steel with the exception of handrail, toeplates, grating, checkered plate, stairs, ladders and monorail supports. These are non-Q items which typically see significant service loads during the construction process. Some are designated as II/I, however, II/I seismic loads are considered to be less severe than service loads. Monorails have been load tested as part of startup procedures.

		The joints are selected by Bechtel based on a review of erection drawings prepared by the structural and miscellaneous steel fabricators.
L. Easterwood J. Fletcher	1f-2	Perform re-inspections in accordance with the CAR-19 Inspection Verification Plan. ° Use the project nonconformance program to obtain and document a suitability for service evaluation of inaccessible welds. ° Report all identified deficiencies on an NCR. Bechtel will perform a case by case evaluation of each joint inspected to determine if: ° as-built condition meets design allowables. ° if the as-built condition is a significant deficiency in accordance with 10CFR50.55(e). ° any rework is required.
D. Mauldin J. Fletcher	1f-2.1	Summarize data from 1f-1, 1f-2.
V. McBride D. Armstrong	1f-3.0	Collect relative data from FCR's, CVR's, NCR's for additional structural welds and furnish to Bechtel.
V. McBride D. Armstrong	1f-3.1	Collect information and furnish to Bechtel for evaluation to determine if any additional structurally significant welds were made. Reinspect any additional welds as directed from Bechtel evaluation.
D. Mauldin	1f-4	Prepare summary report on data from items 1f-1, 1f-2, 1f-3.

Finding #2: "An Inspection verification effort of safety-related structural steel welding, undertaken by AWS certified welding inspectors identified several areas of deficiencies. These deficiencies have been categorized below:"

- Undersized welds
- Weld defects
- Incorrect configuration
- Weld underrun
- Weld undercut

RESPONSIBILITY	CORRECTIVE ACTIONS
D. Mauldin J. Ayres	2a) "Determine and document the "root cause" of the previous acceptance of deficient structural welds. Analyze the HVAC Support, Electrical Support, Pipe-Whip Restraint and any other safety-related program utilizing AWS D1.1 Welding to ensure that the same "root causes" inherent in the structural steel welding program were not generic to other programs."
D. Mauldin J. Ayres	2a-1 Review evaluations of DIC inspection program as performed in 1c. Determine if procedures could contribute to "root cause".
D. Mauldin D. Garrett	2a-2 Review inspection training and certification procedures to verify compliance to ANSI N45.2.6 - 1978.
D. Mauldin J. Ayres	2a-3 Analyze the deficiencies found in structurally significant safety related structural steel welds as documented in the CAR-19 Inspection Verification Plan utilizing the original MSSWR, the Re-Inspection Data Sheets, and the Architect Engineer evaluation.

J. Ayres 2a-4 Identify all safety related activities utilizing AWS D1.1 welding.

J. Ayres 2a-5 Review previously compiled information relative to inspection and acceptance of HVAC and Electrical Supports, and Pipe Whip Restraints and any other safety related program utilizing AWS D1.1 . Examples of compiled information include Construction Self Assessment, task force reports, QA audits and surveillances.

D. Mauldin
J. Ayres 2a-6 Summarize results of any previous investigations/reports related to welding/inspection of above items.

D. Mauldin
J. Ayres 2a-7 Analyze programmatic elements utilized in the erection/welding of structural steel and HVAC and Electrical Supports, Pipe Whip Restraints and other items. Develop list of programmatic differences and determine extent to which these differences would influence "root causes".

D. Mauldin 2a-8 Provide summary report items 2a-1 through 2a-7.

Finding #3: "A small number of safety related structural steel welds were not made or had missing material."

RESPONSIBILITY CORRECTIVE ACTIONS

3a) "Forward the "as-built" information to the Architect/ Engineer via an NCR to obtain an engineering evaluation and disposition."

L. Easterwood J. Fletcher	3a-1	Missing welds or material detected in the inspections performed in 1f shall be documented on NCR(s) showing the "as-built" information. These NCR(s) shall be given to the AE for evaluation and disposition.
D. Blizzard F. Raycher	3a-2	Verification of incorporation of design changes.
D. Armstrong	3a-3	Evaluate and determine probable cause of 3a-1.
D. Mauldin	3a-4	Prepare summary report.

Finding #4 One (1) weld was documented as having been inspected when in reality the weld was not made. (Ref. NCR 1SN 20495CW)

RESPONSIBILITY		CORRECTIVE ACTIONS
	4a)	"Investigate the concern to determine the root cause of the error. Immediately notify KG&E Quality Assurance if any other problems of this nature are identified. Document the investigative actions. The notification of KG&E QA shall not preclude the issuance of an NCR."
D. Mauldin D. Armstrong	4a-1	Evaluate the results of the CAR-19 Inspection Verification Plan (i.e., those inspections performed in 1f) and determine whether a pattern of deficiencies is found.
D. Armstrong F. Raycher	4a-2	Identify further actions required if a pattern of deficiencies is found.
D. Mauldin	4a-3	Prepare summary report.

Finding #5: "Objective evidence that the mechanical and structural welding inspection/documentation problems identified in KG&E QA Surveillance Report S-372 were rectified has not been provided."

RESPONSIBILITY	CORRECTIVE ACTIONS
	5a) "Provide objective evidence that the mechanical and structural support welding inspection/documentation problems identified in Surveillance Report S-372 have been corrected. If such evidence is not available, research the extent of the problem and take the appropriate remedial actions."
D. Mauldin	5a-1 Review and provide objective evidence that Mechanical Deficiency Reports identified in S-372 have been correctly closed out.
D. Mauldin	5a-2 Review and provide objective evidence that Civil Deficiency Reports identified in S-372 have been correctly closed out.
D. Mauldin	5a-3 Prepare summary report.

RESPONSIBILITY #6 REPORT

D. Mauldin	A final comprehensive report including all evaluations performed and the results of activities conducted to provide objective evidence to satisfy the corrective actions required by CAR-19 will be prepared and submitted to KG&E Quality. This report will also include an evaluation of Construction/Quality programs in areas other than AWS D1.1 welding to determine the potential of programmatic deficiencies.

Lenny MARTIN Sec. Reg

COS 1331

16.8
2047 6
Aux

MISC/STRUCTURAL STEEL WELD RECORD (SAFETY-RELATED)

DWG. K6710 0 (E502) C-121-0629-03 JOINT NO. 524B2 AREA/LOCATION AJ line

BASE MATERIAL PIECE OR HEAT NO. 524B2 TO A & D welds*

MATERIAL TYPE A-36 W-100 Ser. No. 31298

FILLER MATERIAL HEAT NO./LOT NO. 02-2-A831R WELD PROCEDURE N-1-1-A-6 REV 4

WELDER ID D217 CODE AWS D1.1-75 QCP-VII-200

VISUAL INSPECTION R.E. Smith 4/1 Rev A-11 DATE 12/14/78 JOINT PREP NA

TYPE NDE NA FIT-UP NA

RESULTS NA

QC INSPECTOR NA DATE NA REVIEWED BY JS

REMARKS * Beam clips to A & B

DANIEL CONSTRUCTION CO. DOCUMENT CONTROL JAN 25 1979

DANIEL JAN 24 1979 IN
QUALITY CONTROL
DOCUMENT SECTION

C R Gpm REVIEWED
Initials 4J Date 2/28/84

16.8
2038

MISC/STRUCTURAL STEEL WELD RECORD (SAFETY-RELATED)

DWG. K6710 0 (E502) Rev 2 JOINT NO. 529B2 AREA/LOCATION 153

BASE MATERIAL PIECE OR HEAT NO. 529B2 TO beam clips

MATERIAL TYPE A36 W-100 Ser. No. 53230

FILLER MATERIAL HEAT NO./LOT NO. 02-2-A831R WELD PROCEDURE N-1-1-A-6 Rev

WELDER ID D189 CODE AWS D1.1-75 QCP-VII-200

VISUAL INSPECTION R. Smith 4/1 Rev A-11 DATE 3/19/79 JOINT PREP NA

TYPE NDE NA FIT-UP NA

RESULTS NA

QC INSPECTOR NA DATE NA ~~REVIEWED BY~~ BL

REMARKS A14 wall surface : AG line welds B&C

DANIEL CONSTRUCTION CO. DOCUMENT CONTROL 1979

DANIEL JUN 27 1979 INTL
QUALITY CONTROL
DOCUMENT SECTION

C R Gpm REVIEWED
Initials

C05 1331

16.8
20916
Aux

MISC/STRUCTURAL STEEL WELD RECORD (SAFETY-RELATED)

DWG. C-121-0629-03 K6710 0 (E502) JOINT NO. 524B2 AREA/LOCATION AJ line

BASE MATERIAL PIECE OR HEAT NO. 524B2 TO A & D welds *

MATERIAL TYPE A-36 W-100 Ser. No. 31298

FILLER MATERIAL HEAT NO./LOT NO. 02-2-A831R WELD PROCEDURE N-1-1-A-6 REV 4

WELDER ID D217 CODE AWS D1.1-75 QCP-VII-200

VISUAL INSPECTION R.E. Smith 4/1 Rev A-11 DATE 12/14/78 JOINT PREP NA

TYPE NDE NA FIT-UP NA

RESULTS NA

QC INSPECTOR NA DATE NA REVIEWED BY JSB

REMARKS * Beam clips [illegible]

C R G pm REVIEWED
Initials 4E Date 2/28/84

DANIEL CONSTRUCTION CO.
DOCUMENT CONTROL
JAN 25 1979

DANIEL JAN 24 1979 INT
QUALITY CONTROL
DOCUMENT SECTION

16.8
2038

MISC/STRUCTURAL STEEL WELD RECORD (SAFETY-RELATED)

DWG. K6710 0 (E502) Rev 2 JOINT NO. 529B2 AREA/LOCATION 153

BASE MATERIAL PIECE OR HEAT NO. 529B2 TO beam clips

MATERIAL TYPE A36 W-100 Ser. No. 53230

FILLER MATERIAL HEAT NO./LOT NO. 02-2-A831R WELD PROCEDURE N-1-1-A-6 Rev 4

WELDER ID D189 CODE AWS D1.1-75 QCP-VII-200

VISUAL INSPECTION R. Smith 4/1 Rev A-11 DATE 3/19/79 JOINT PREP NA

TYPE NDE NA FIT-UP NA

RESULTS NA

QC INSPECTOR NA DATE NA REVIEWED BY BL

REMARKS A14 wall face : A5 line
welds B&C

DANIEL CONSTRUCTION CO.
DOCUMENT CONTROL
1979

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DOCUMENT SECTION

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WC-AP-002.5
Rev. 8-16-84

PROCEDURE CHANGE NOTICE

NOTICE NUMBER PCN 0014/R1

PROCEDURE NUMBER OCP-VII-200

REVISION NUMBER 20

JUSTIFICATION FOR CHANGE:

To include inspection criteria to be in compliance with Bechtel Specification 10466-C-122.

REQUESTED CHANGE(S):

Add Paragraph 3.2.5

DANIEL CONSTRUCTION CO.
DOCUMENT CONTROL
NOV 02 1984

PROCEDURES AFFECTED BY THIS CHANGE NOTICE:

NONE

(Additional procedures to be listed on back, if necessary.)

APPROVALS:

11-2-74
ORIGINATOR DATE

11/2/84
PROJECT MANAGER DATE

11/2/84
PROJECT QUALITY MGR. DATE

11/2/84
KG&E CONSTRUCTION MGR. DATE

NOTE: Upon issuance by Document Control, responsible holders of this document are required to place this document immediately following Page 1 of the affected procedure(s), identified above.

1.0 SCOPE

This instruction provides direction for the inspection and documentation of AWS D1.1 structural steel welds identified for inspection by Bechtel Engineering in accordance with KG&E CAR-19.

2.0 RESPONSIBILITIES

2.1 The KG&E Construction Quality Control, Lead Welding Quality Cont Engineering shall be responsible for the implementation of this instruction.

2.2 Personnel certified in accordance with ANSI N45.2.6-78 - "Qualificati of Inspection, Examination, and Testing Personnel for Construction Phase of Nuclear Power Plants" and American Welding Society QC1 - "Standard for Qualification and Certification of Welding Inspectors" shall be responsible for performing the inspections and documentation activities defined in this instruction.

3.0 GENERAL

3.1 Inspections specified in this instruction shall be performed visually utilizing fillet weld gauges, steel rulers or steel tape measures capable of measurements within 1/16 inch increments. Undercut gages will be capable of measuring 1/32".

3.2 The welds shall be inspected in accordance with the design drawing and paragraph 8.15.1 of the AWS - Structural Welding Code D1.1-75 (See Page 3) with the following exceptions:

3.2.1 Paint on welds - Paint will exist on most of the welds to be inspected, in these cases visual examination shall be made and the results documented in accordance with Section 4.0. Engineering evaluation of the inspection results is performed knowing that paint does exist on most welds.

Foreign material (fireproofing, etc) may remain after cleaning. This condition is acceptable if the foreign material does not preclude, in the judgment of the inspector, a determination of the weld status per the inspection criteria outlined in this appendix.

If the foreign material precludes this determination, the weld shall be recleaned prior to inspection.

3.2.2 Convexity - Fillet welds need not satisfy the convexity limitations of AWS D1.1, Section 3.6.1 Reference Bechtel Specification 10466-C-122 and 10466-C-132 paragraph 8.5.3.

3.2.3 Undercut - Undercut shall not exceed 1/32 inch. Reference Bechtel Specification 10466-C-122 and 10466-C-132 paragraph 8.5.2.

3.2.4 "Nail Holes" (Construction Aids) - "Nail Holes" in embeds in some instances will be located where a weld is required. The "nail holes" may remain open provided the weld on both sides of the "nail hole" is increased from the size shown on the drawing by 1/16 of an inch for a length of 2 inches per side.

Reference Bechtel drawing C-1003 Miscellaneous Steel General Note II.

3.2.5 Gouges - Gouges in base materials shall not be longer than 3 inches nor deeper than 3/16 of an inch. Gouges in weld metal shall not reduce the section thickness of the weld below specified size.

Gouges exceeding the above shall be noted on the Weld Data Sheet (Exhibit A or B) including details such as depth, length, and location on base or weld material.

Document discrepancies on a nonconformance report.

3.3 When inspection reveals a rejectable weld or joint configuration (excluding) clip to embed top or bottom weld overrun), the entire joint is to be "as-built" inspected and all weld sizes and lengths documented. The "as-built" weld sizes should be accurate as possible and should reflect any significant oversized welds within the joint.

3.4 Any missing material identified as a result of inspection per the design drawing shall be identified on an NCR.

3.5 Document any welder identification (D number) marked on the joint.

4.0 DOCUMENTATION

4.1 The inspection results will be documented on an inspection report similar to Exhibit A or B and submitted to KG&E Construction Quality Control for final review for completeness and accuracy. These reports must be completed in a consistent manner and as a minimum shall contain the following information.

1. Description and size of weld deficiency.
2. The dimension (distance) between beam and embed (to be reported as "set-back gap").
3. Drawing and detail number.
4. Date of inspection.
5. Name and certification number of the AWS CWI who performed the inspection.
6. Accept/reject.

4.2 When any condition is found that does not meet the acceptance criteria outlined in paragraph 3.2 and 3.3 of this instruction, a nonconformance report will be generated in accordance with the applicable project procedure and forwarded to Bechtel for evaluation. In order to reduce the amount of paperwork, it is acceptable to generate one nonconformance report per building.

4.3 The documentation generated as a result of this Inspection Verification Plan shall become an attachment to CAR-19.

5.0 EXHIBITS

5.1 Exhibit A - Weld Data Sheet

5.2 Exhibit B - Weld Data Sheet

8.15 QUALITY OF WELDS

8.15.1 Visual Inspection. All welds shall be visually inspected. A weld shall be accepted by visual inspection if it shows that:

8.15.1.1 The weld has no cracks.

8.15.1.2 Thorough fusion exists between weld metal and base metal.

8.15.1.3 All craters are filled to the full cross section of the welds.

8.15.1.4 Weld profiles are in accordance with 3.6.

8.15.1.5 The sum of diameters of piping porosity does not exceed 3/8 in. (9.5 mm) in any linear inch of weld and shall not exceed 3/4 in. (19.0 mm) in any 12 in. (305 mm) length of weld.

8.15.1.6 Fillet welds in any single continuous weld shall be permitted to underrun the nominal fillet size required by 1/16 in. (1.6 mm) without correction provided that the undersize weld does not exceed 10 percent of the length of the weld. On web-to-flange welds on girders, no underrun is permitted at the ends for a length equal to twice the width of the flange.

3.6 WELD PROFILES

3.6.1 The faces of fillet welds may be slightly convex, flat, or slightly concave as shown on page 4, with none of the unacceptable profiles also shown on Page 4. Except at outside corner joints, the convexity shall not exceed the value of 0.1S plus 0.03 in. where S is the actual size of the fillet weld in inches. (See Page 4).

3.6.2 Groove welds shall preferably be made with slight or minimum reinforcement except as may be otherwise provided. In the case of butt and corner joints, the reinforcement shall not exceed 1/8 in. (312 mm) in height and shall have gradual transition to the plane of the base metal surface (see Page 4). They shall be free of the discontinuities shown for butt joints on Page 4.

3.6.3 Surfaces of butt joints required to be flush shall be finished so as not to reduce the thickness of the thinner base metal or weld metal by more than 1/32 in. (0.8) or five percent of the thickness, whichever is smaller, or leave reinforcement that exceeds 1/32 in. However, all reinforcement must be removed where the weld forms part of a faying or contact surface. Any reinforcement must blend smoothly into the plate surfaces with transition areas free from edge weld undercut. Chipping may be used provided it is followed by grinding. Where surface finishing is required, its roughness value[11] shall not exceed 250 µin. (6.3). Surface finished to values of over 125 µin. (3.2 µm) through 250 µin. shall be finished parallel to the direction of primary stress. Surfaces finished to values of 125 µin. or less may be finished in any direction.

3.6.6 Welds shall be free from overlap.

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[11] ANSI B46.1 Surface Texture, in microinches (µin.).

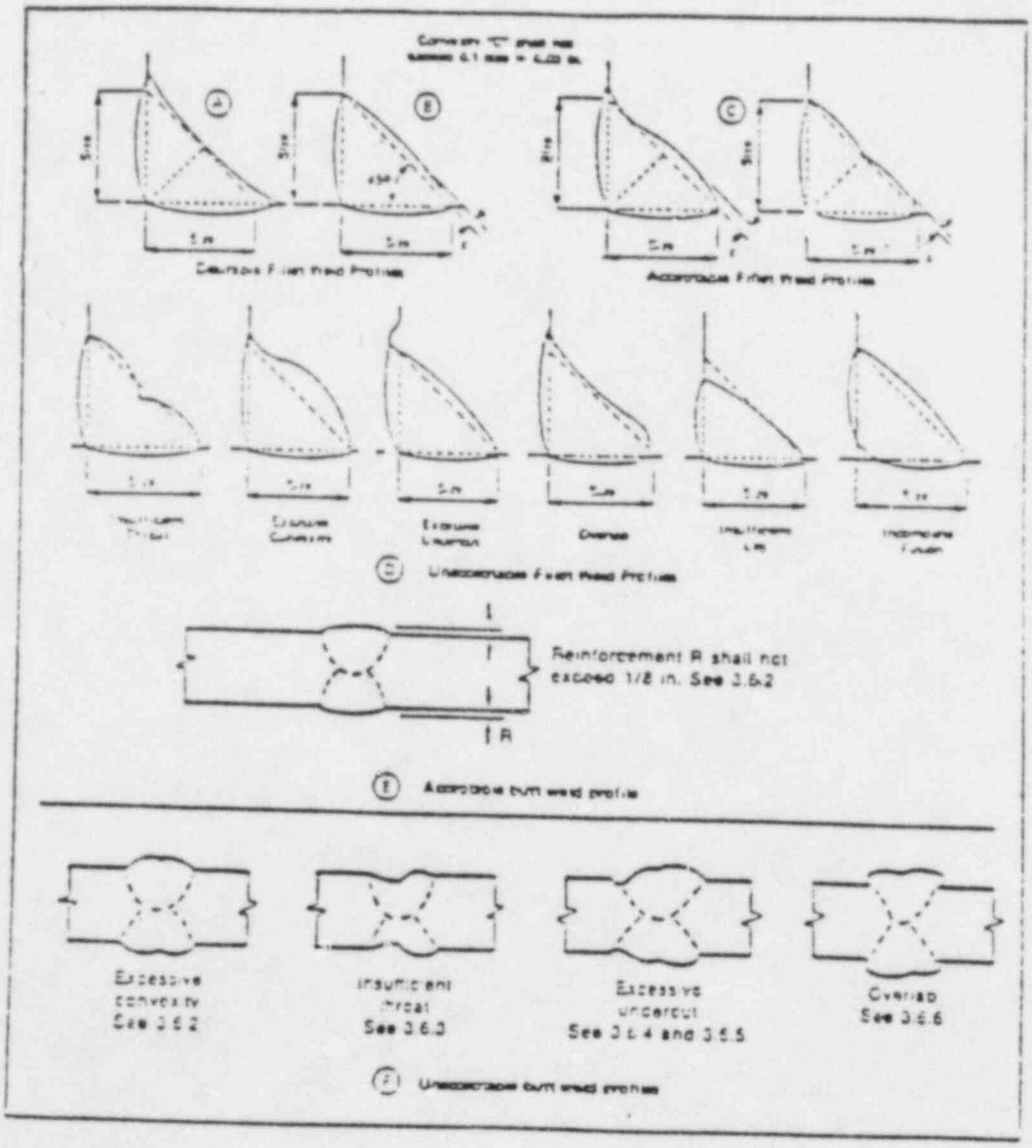

Fig. 3.5—Acceptable and unacceptable weld profiles.

Connection # ____________ WELD DATA SHEET AREA ____________

APPENDIX VIII
EXHIBIT A

	REQUIRED	ACTUAL	[illegible]
1-			
2-			
3-			
4-			
5-			
6-			
7-			
8-			
9-			
10-			
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15-			
16-			
17			
18-			

INSPECTOR ____________ DATE ____________ DRAWING No ____________

CWI No ____________ ELEV. ____________ DETAIL No ____________

* Additional Comments on Reverse Side.

Joint or Weld Number	Accept	Reject	Initials & Date	[illegible] [illegible] Height	Undercut	[illegible]	Arc Strike	Lack of Fusion	Incomplete Penetration	Crack	Inclusions	Concavity	Remarks

APPENDIX VIII
EXHIBIT B