

9009 Spruce Court
Cypress, California 90630
Date: October 16, 1982
Time: 12:30pm.

I, E. Earl Kent, voluntarily make the following statement to Messrs. Philip V. Joukoff and Owen C. Shackleton Jr. who have identified themselves to me as investigators for the U. S. Nuclear Regulatory Commission (NRC). I make this statement freely with no threats or promises of reward having been made to me.

I am 57 years old and have worked since ~~March 1943~~ ^{JUNE 1942} as a welder, welding quality control inspector, welding engineer, and author of welding articles for welding journals. In ~~1953~~ ^{JAN. 1953} I received a diploma for completion of the Structural Engineering Course from the International Correspondence School, Scranton, Pennsylvania. I worked for Bechtel Power Corporation as a Senior Quality Control Engineer in welding at the San Onofre Nuclear Generating Station (SONGS) from October, 1980 until ~~September~~ ^{AUGUST}, 1981.

During my employment at SONGS I identified the following concerns which were identified to me by the NRC personnel who interviewed me on October 15, 1982 as possibly affecting nuclear safety systems, AND OTHER ITEMS.

- (1) Pipe fitters used pipe cutters to make scribe-marks for socket weld fitup measurements. These scribe marks caused grooves in both stainless and carbon steel pipes about 1" back from the weld area. I am concerned that these grooves might cause stress raisers. These conditions exist on socket welded fittings ~~all over~~ ^{SOMETIMES} Units 2 and 3, ~~and possibly a few in Unit 1.~~ ^{AT RANDOM IN}
- (2) Bechtel designers use fillet welds on ~~web to web~~ connections of beams in pipe supports and tray hangers and do not weld all around the joint to restrain forces in all directions. I feel this is a code violation. No prototype tests were conducted to verify the adequacy of these welds. Therefore, the actual structural strength of the electrical tray hanger/tube steel welds used or the actual material at SONGS ~~is not~~ ^{is} not fully known. This also applies to pipe supports. I also feel that the failure to weld all around the joint is a generic problem. Unfortunately, and in my opinion, ~~wrongly~~ ^{wrongly}, the codes do not ~~always~~ ^{OFTEN} demand ~~full~~ ^{PARTIAL} ~~root~~ ^{JOINT} penetration, ~~wherever~~ ^(SOMETIMES) ~~all~~ ^{FULL JOINT} ~~around~~ ^{INTEGRITY} ~~not~~ ^{is} required.
- (3) Some requires adequate root penetration of fillet welds. I recall that some of the vendor supplied welded hardware ~~did~~ ^{did} not have adequate root penetrations. The one vendor I can recall is Zack, I believe a supplier of HVAC equipment. I remember one instance on a piece of Zack hardware where a fillet weld with inadequate ~~root~~ ^{WELDING} penetration.

E.H.
AFTER.

was identified during inspection on site. This instance was subsequently corrected by weld repair before installation in the plant. I don't remember if this equipment was used in SWGS Units 2 or 3. I recommend that the NRC examine the beginning and end of fillet welds, to assure root penetration at these areas, and conduct destructive testing of selected supports - supplied by this vendor to determine if other fillet welds have inadequate root penetrations, OR OTHER CODE VIOLATIONS.

E.H.
AND VERIFY THAT ALL CRATERS ARE FILLED,

E.H.
AND OTHERS WERE

WOULD BE PLACED, I WAS TOLD,
E.H.

(4) A steel bracket was placed between a Unit 1 hydrogen line on trip for steam generator. This was done because the hydrogen line had worn thin due to rubbing with another line. I believe maintenance people at the site who were working during the period when damage due to the Unit 1 diesel generator fire was being corrected would remember and be able to locate the design change and spacer. I don't recall the exact location of the hydrogen line. To my best recollection there wasn't equipment within ten feet. I don't remember if there was any nuclear safety-related equipment nearby. I am concerned for the integrity of nuclear safety-related equipment, if located nearby, and about the potential for loss of human life and fire, should this line rupture. I recommend NRC conduct an examination of this hydrogen line and make certain it has sufficient wall thickness to be safely operated. MOST LIKELY, I PREVENTED A MAJOR FIRE IN UNIT 1 AND PROBABLY SAVED THE LIVES OF SEVERAL (OR MORE) WORKERS THERE!

E.H.
OF THE OPINION

MANY
E.H.

(5) I am certain that weld end returns are not required on Bechtel drawings. This is in violation of AWS-D1.1, Section 8, paragraphs 8.8.6, 8.8.6.1, and 8.8.6.2. These conditions exist on details in structural applications. A two page Bechtel Power Corporation table established that certain pipe supports must conform to AWS-D1.1 requirements.

E.H.

1974 EDITION
E.H.

E.H.
AND OTHER ITEMS

I BELIEVE

(6) Bechtel Construction Specification CS - F207, Revision 7, dated April 18, 1980, paragraphs 5.6 and 5.7, contains visual examination criteria used by Bechtel for pipe supports and reference the ASME B&PV Code, Section III, Subsection WF. I told John O'Dell, investigative reporter for the Los Angeles Times, that the visual criteria of CS - F207 are not in accordance with the above code requirements, particularly in CS - F207 paragraphs 5.6.1.3 (porosity and slag), weld convexity height acceptance criteria, 5.6.1.9 (underfilled groove weld craters), 5.6.1.11 (arc strike acceptance criteria, and 5.7.2 (allowing groove welds with fillet cans to be welded as fillet welds).

E.H.
I MAY HAVE

(I WAS TOLD) E.H.

(7) Bechtel generated a 92 page NCR on electrical tray hangers. I question whether the welds made on electrical supports prior to the NCR resolution were fixed. ABSOLUTELY OR COMPLETELY

E.H.

IN MY OPINION,

(8) Bechtel has not complied with the requirements of AWS D1.1 (1974 edition), paragraphs 5.12.1.5.(2)(Y) and 8.15.1.3, regarding filling of open weld craters on tray hangers to full

AND OTHER ITEMS

(b)
E.H.

E.H.

E.K.

cross section of the weld.

IN MY OPINION,

(9) Bechtel has not removed arc strikes from base metal pipe supports or structural steel as required by AWS D1.1 paragraph 4.4. *ALL OR BLENISHED E.K.*

(10) I observed instances where run off plates were not used as required by AWS D1.1 paragraph 4.6 of groove weld terminations. I cannot recall any specific locations, but I do recall observing this condition on beam and girder splices, *HAD NOT BEEN E.K.* AS SUPPLIED BY AT LEAST ONE VENDOR, *E.K.*

(11) I believe that a spacer plate is missing on the upper inside door hinge of the Unit 2 containment personnel hatch because I observed a gap in the weld joint of about 1/4 inch. I brought this to the attention of my supervisor, who also shared that belief. I believe that by bringing this condition to the attention of my supervisor I had properly performed my duty to identify this condition. I did not compare the drawing requirements to the installed condition in making this determination of a missing spacer plate, *BECAUSE MY SUPERVISOR HAD INDICATED TO ME THAT IT WAS THE VENDOR'S PROBLEM TO CORRECT IT* *E.K.*

(12) I believe that Bechtel has misinterpreted the requirements of the ASME Section III welding standards regarding socket weld engagement length without initiating a code case and obtaining appropriate code relief. The ASME code requires a gap between the pipe end and the fitting of "approximately 1/16 inch". I believe that the code should provide a more definitive acceptance criteria than merely "approximately 1/16 inch". *EVIDENTLY BECHTEL WILL ALLOW ANY DIMENSION, AS LONG AS THE PIPE IS NOT TOTALLY WITHE* *I HAD WORK TO IMMEDIATE*

E.K.

AT MIDLAND MICHIGAN'S TWIN NUCLEAR PLANT,

(13) Bechtel specification WC-2, sheet 20, note 1, requires "shall not exceed 1/8 inch..." regarding maximum groove weld reinforcement height. This requirement should read "shall not exceed 1/8 inch..." as required by the ASME Section III code on groove weld reinforcement. The 1/8 inch height is implemented at San Onofre. *FROM T. SOLK*

DOCUMENTATION

MISTAKES

AND

E.K.

AND BECHTEL

(14) I believe that the caliber of individuals employed by Feabody Testing & to perform nondestructive examination (NDE) on welds in nuclear service applications was not acceptable. This belief is based on the observation of many spelling errors, such as the incorrect spellings of the words "fillet" and "weld", on NDE reports prepared by these individuals. Because of these observed spelling errors, I question the abilities of these NDE personnel to perform the required examinations as required by their procedures. I believe that established industry standards regarding the qualification of NDE personnel are not sufficient to assure an adequate level of personnel capability and knowledge in this very important area of inspection. *MAY BE, ALSO, MISTAKENLY E.K.* *E.K. "FIL" "WEL" AND OTHER* *KNOW EXISTS E.K.*

I have advised the above named NRC personnel of other concerns I have regarding inadequacies that I see exist in Industry Codes and Standards (i.e. AWS, ASME, AISC, etc.). The NRC representatives have told me that these areas are not within the jurisdiction of the NRC and although I do

SOME OF THESE ALLOW INADEQUATE WELD, PROTECTION (FOR EXAMPLE, SHORT-CIRCUITING ARC IN GAS METAL ARC WELDING)

not necessarily agree with this, I do understand that this is the case.. MAY BE
The NRC representatives have also told me that I can report my areas of concern regarding Codes to the applicable code committee. HOWEVER, WHERE SAFETY & LIFE IS AT STAKE, I ASK THEM TO HELP MY EFFORTS AS MUCH AS POSSIBLE.
I further have advised the NRC representatives that I have many concerns regarding welding done on non-nuclear safety related systems and equipment. I have been advised by the NRC representatives that these areas are also not within the jurisdiction of the NRC. The NRC representatives have told me that I can report these concerns directly to the utility, SCE, or whatever other local, state, or federal agency that has jurisdiction.

BUT ALL NUCLEAR PLANTS IN THE UNITED STATES NEED HELP IN RESOLVING PROBLEMS THAT I KNOW EXIST

E.K.

I have read the foregoing statement consisting of this and four other typewritten pages. I have made and initialed any necessary corrections and have signed my name in ink in the margin of each page. I swear that the foregoing statement is true and correct. Signed on _____

Signature: _____
E. Earl Kent.

Subscribed and sworn to before me this _____ day of _____
1982 at _____

Investigator: _____
Owen C. Shackleton Jr.

Witness: _____
Philip V. Joukoff
Investigator, OISFPO

9809 Spruce Court
Cypress, California 90630
Date: October 16, 1982
Time: 12:30 p.m.

I, E. Earl Kent, voluntarily make the following statement to Messrs. Philip V. Joukoff and Owen C. Shackleton Jr., who have identified themselves to me as investigators for the U.S. Nuclear Regulatory Commission (NRC). I make this statement freely with no threats or promises of reward having been made to me.

I am 57 years old and have worked since June 1942 as a welder, welding quality control inspector, welding engineer, etc., and author of welding articles for welding journals. In January 1955, I received a diploma for completion of the Structural Engineering Course from the International Correspondence School, Scranton, Pennsylvania. I worked for Bechtel Power Corporation as a Senior Quality Control Engineer in welding at the San Onofre Nuclear Generating Station (SONGS) from October, 1980 until August, 1981.

During my employment at SONGS, I identified the following concerns which were identified to me by the NRC personnel who interviewed me on October 15, 1982 as possibly affecting nuclear safety systems, and other items.

- (1) Pipe fitters sometimes used pipe cutters to make scribe marks for socket weld fitup measurements. These scribes marks caused grooves in both stainless and carbon steel pipes about 1" back from the weld area. I am concerned that these grooves might cause stress raisers. These conditions exist on socket welded fittings at random in Units 2 and 3, and possibly a few in Unit 1.
- (2) Bechtel designers use fillet welds on connections of beams in pipe supports and tray hangers and often do not weld all around the joint to restrain forces in all directions. I feel this is a code violation. No proto-type tests, to my personal knowledge, were conducted to verify the adequacy of these welds. Therefore, the actual structural strength of the electrical tray hanger/tube steel welds used or the actual material at SONGS may not be truly known. This also applies to pipe supports. I also feel that the partial joint strength (less than full joint integrity) and failure to weld all around the joint is a generic problem. Unfortunately, and in my opinion, the codes do not always demand full strength welding, whether all around or not.
- (3) ASME requires adequate root penetration of fillet welds. I recall that some of the vendor supplied welded hardware appeared to not have adequate root penetrations. The one vendor I can recall is Zack, I believe a supplier of HVAC equipment. I remember one

instance on a piece of Zack hardware where a fillet weld with inadequate welding was identified during inspection on site. This instance was subsequently corrected by weld repair after installation in the plant. I don't remember if this equipment was used in SONGS Units 2 or 3. I recommend that the NRC examine the beginning and end of fillet welds to assure root penetration at these areas, and verify that all craters are filled, and conduct destructive testing of selected supports supplied by this vendor to determine if other fillet welds, and groove welds, have inadequate root penetrations or other code violations.

- (4) A steel bracket would be placed, I was told, between a Unit 1 hydrogen line on trip for steam generator. This was done because the hydrogen line had worn thin due to rubbing with another line. I believe maintenance people at the site who were working during the period when damage due to the Unit 1 diesel generator fire was being corrected would remember and be able to locate the design change and spacer. I don't recall the exact location of the hydrogen line. To my best recollection, there wasn't equipment within ten feet. I don't remember if there was any nuclear safety-related equipment nearby. I am concerned for the integrity of nuclear safety-related equipment, if located nearby, and about the potential for loss of human life and fire, should this line rupture. I recommend NRC conduct an examination of this hydrogen line and make certain it has sufficient wall thickness to be safely operated. Most likely, I prevented a major fire in Unit 1, and probably saved the lives of several (or more) workers there.
- (5) I am of the opinion that weld end returns are not required on Bechtel drawings. This is in violation of AWS-D1.1, Section 8, 1974 Edition, paragraphs 8.8.6, 8.8.6.1, and 8.8.6.2. These conditions exist on details in many structural applications. A two-page Bechtel Power Corporation table establishes that certain pipe supports and other items must conform to AWS-D1.1 requirements.
- (6) Bechtel Construction Specification CS-P207, Revision 7, dated April 18, 1980, paragraphs 5.6 and 5.7, contains visual examination criteria used by Bechtel for pipe supports and reference the ASME B&PV Code, Section III, Subsection NF. I may have told John O'Dell, investigative reporter for the Los Angeles Times, that I believe the visual criteria of CS-P207 are not in accordance with the above code requirements, particularly in CS-P207 paragraphs 5.6.1.3 (porosity and slag), weld convexity height acceptance criteria, 5.6.1.9 (underfilled groove weld craters), 5.6.1.11 (arc strike acceptance criteria), and 5.7.2 (allowing groove welds with fillet caps to be welded as fillet welds).
- (7) Bechtel generated (I was told) a 92-page NCR on electrical tray hangers. I question whether the welds made on electrical supports prior to the NCR resolution were adequately or completely fixed.

- (8) Bechtel has not, in my opinion, complied with the requirements of AWS-D1.1 (1974 Edition), paragraphs 5.12.1.5.(2).(b) and 8.15.1.3, regarding filling of open weld craters on tray hangers and other items to full cross section of the weld.
- (9) Bechtel has not, in my opinion, removed all arc strikes or blemishes from base metal on pipe supports or structural steel as required by AWS-D1.1, paragraph 4.4.
- (10) I observed instances where run off plates had not been used as required by AWS-D1.1, paragraph 4.6, of groove weld terminations. I cannot recall any specific locations, but I do recall observing this condition on beam and girder splices, as supplied by at least one vendor.
- (11) I believe that a spacer plate is missing on the upper inside door hinge of the Unit 2 containment personnel hatch because I observed a gap in the weld joint of about 1/4 inch. I brought this to the attention of my supervisor (Don Martin), who also shared that belief. I believe that by bringing this condition to the attention of my supervisor I had properly performed my duty to identify this condition. I did not compare the drawing requirements to the installed condition in making this determination of a missing spacer plate, because my supervisor had indicated to me that it was the vendor's problem to correct it. I had other work to do immediately.
- (12) I believe that Bechtel has misinterpreted the requirements of the ASME Section III welding standards regarding socket weld engagement length without initiating a code case and obtaining appropriate code relief. The ASME code requires a gap between the pipe end and the fitting of "approximately 1/16 inch." I believe that the code should provide a more definitive acceptance criteria than merely "approximately 1/16 inch." Evidently, Bechtel will allow any dimension, as long as the pipe is not totally withdrawn from the socket.
- (13) Bechtel specification WQ-2, sheet 20, note 1, requires "shall not exceed 1/3 inch ..." regarding maximum groove weld reinforcement height at Midland Michigan's Twin Nuclear Plant. This requirement should read "shall not exceed 1/8 inch ..." as required by the ASME Section III code on groove weld reinforcement. The 1/3 inch height may be, also, mistakenly implemented at San Onofre.
- (14) I believe that the caliber of individuals employed by Peabody Testing and others to perform nondestructive examination (NDE) on welds in nuclear service applications was not acceptable. This belief is based on the observation of many documentation mistakes and spelling errors, such as the incorrect spellings of the words "fillet" and "weld," as "filet wel," on NDE reports prepared by these individuals. Because of these observed spelling and other

errors, I question the abilities of these NDE personnel to perform the required examinations as required by their procedures. I believe that established industry and Bechtel standards regarding the qualification of NDE personnel are not sufficient to assure an adequate level of personnel capability and knowledge in this very important area of inspection.

I have advised the above named NRC personnel of other concerns I have regarding inadequacies that I know exists in Industry Codes and Standards (i.e. AWS, ASME, AISC, etc.). Some of these allow inadequate welding processes (for example, short-circuiting arc in gas metal arc welding). Adhesion instead of cohesion is possible in critical areas. The NRC representatives have told me that these areas are not within the jurisdiction of the NRC and although I do not necessarily agree with this, I do understand this may be the case. The NRC representatives have also told me that I can report my areas of concern regarding Codes to the applicable code committee. However, where safety and life is at stake, I ask them to help my efforts as much as possible, not only at San Onofre, but all nuclear plants in the United States. I need help in resolving problems that I know exists.

I further have advised the NRC representatives that I have many concerns regarding welding done on non-nuclear safety-related systems and equipment. I have been advised by the NRC representatives that these areas are also not within the jurisdiction of the NRC. The NRC representatives have told me that I can report these concerns directly to the utility, SCE, or whatever other local, state, or federal agency that has jurisdiction.

I have read the foregoing statement consisting of this and four other typewritten pages. I have made and initialed any necessary corrections and have signed my name in ink in the margin of each page. I swear that the foregoing statement is true and correct. Signed on _____ at _____.

Signature: _____

E. Earl Kent

Subscribed and sworn to before me this _____ day of _____, 1962 at _____.

Investigator: _____

Owen C. Shackleton Jr.

Witness: _____

Philip V. Joukoff
Investigator, OISFFO