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# GOVERNMENT ACCOUNTABILITY PROJECT

Institute for Policy Studies

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June 21, 1984 JUN 21 AIO:42

Nunzio J. Palladino, Chairman  
Victor Gilinsky, Commissioner  
Thomas Roberts, Commissioner  
James Asselstine, Commissioner  
Frederick Bernthal, Commissioner  
U.S. Nuclear Regulatory Commission  
1717 H Street N.W.  
Washington, D.C. 20555

Re: Diablo Canyon Nuclear Power  
Plant Units I and II, Docket  
Numbers 50-275 and 50-323

Dear Commissioners:

(2.206)

On behalf of the San Luis Obispo, California, Mothers for Peace ("Mothers"), this submission summarizes 17 additional witness statements gathered in support of their May 3, 1984 petition to defer any further licensing decisions on the Diablo Canyon nuclear power plant until, inter alia, completion of a third party design verification program; publication of a Nuclear Regulatory Commission (NRC) Construction Assessment Team (CAT) report to determine the need for a comprehensive reinspection of construction at the plant; development of a full factual record on Pacific Gas & Electric's character and competence to operate a nuclear power plant; and investigation 1/ by the Office of Inspector and Auditor (OIA) to determine whether the NRC staff responsible for Diablo Canyon made misleading or material false statements to the Commission. This submission also extends the requested relief to Unit II of the Diablo Canyon facility, since in some cases the new evidence of program violations is based on work performed in Unit II.

The 17 statements contain 302 new allegations of legal violations, including 100 instances of misleading or material false statements, and additional quality assurance (QA) violations. The disclosure also includes new supporting evidence or analysis for allegations raised previously. Exhibit A is an index listing the additional statements, which are referenced below as Attachments 1-17. 2/ Counsel will break down the specific allegations with NRC personnel from the Office of Investigations and representatives of any CAT team formed to pursue the charges. The evidence is summarized below.

1/ To avoid any confusion, the Mothers' request to defer licensing until an OIA "investigation" includes completion of the probe and public release of the ensuing report.

2/ Fifteen of the statements are sworn affidavits, while two are reports to Congress. Six of the 15 affidavits are from confidential

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I. QUALITY ASSURANCE BREAKDOWN AT DIABLO CANYON

A. Construction Quality Assurance

1. Breakdown in the reporting system. Over the last few months, management has mounted a campaign for QC inspectors to stop using the formal reporting system for QA violations. Management has instructed inspectors to write up problems through memoranda, rather than formal Discrepancy Reports (DR's) or Deficient Condition Notices (DCN's). In any form, Pullman QA management is processing the reports informally through limited-distribution memos, rather than through the official system of engineering review and tracking for similar deficiencies. In some cases the reports are being "voided" or "lost". The bottom line is that the QA system is being circumvented when it is most needed, just prior to operation. In the process, PG&E and the NRC conveniently have been left officially ignorant of the problems. (Attachment 3, at pp. 1-2; Attachment 7, at pp. 15-17). A March 14, 1984, memorandum restricting QA/QC personnel from writing DR's is enclosed as Attachment 18.

2. Ineffective corrective action. The system of repairing hardware deficiencies and correcting program deficiencies has reached new lows. To illustrate, PG&E's reinspection program for cracked welds in the vital Component Cooling Water System only catches surface flaws, when the significant defects are deep inside at the root pass. (Attachment 1, pp. 2-3).

When deeper cracks were caught by chance, the weld repairs were not always documented. (Attachment 7, p. 12). This means that the program will not be extended to check for analogous problems, and that the uncontrolled repairs could even exacerbate the original flaws. Over the long term, the same practice has occurred with sensitive safety-related valves in the Emergency Core Cooling System (ECCS) which have been disassembled and repaired without documentation. (Attachment 8, at pp. 1-2).

The most dramatic example of ineffective corrective action illustrates a recent trend -- a promise to do it right in the future but forget about everywhere the work is wrong. This development effectively concedes whistleblower allegations but fails to fix any of the dormant safety hazards still existing. One example involves certain A-307 bolts which have been welded to the containment liner. This material must be carefully selected to avoid creating embrittlement and neutralizing the anti-corrosive properties of attached stainless steel. PG&E has vigorously defended the use of these bolts on

witnesses who have not consented to release of their affidavits to the licensee PG&E, even with their names and identifying characteristics deleted. They recognize that otherwise it is impossible to maintain anonymity. The staff's previous practice of turning over "censored" affidavits already has resulted in loss of anonymity for three confidential witnesses. As a result, counsel is forwarding statements from confidential witnesses to the Office of Investigations (OI) when prior confidentiality agreements have been signed. At a June 5, 1984 meeting, OI representatives agreed not to permit such affidavits to be forwarded to the licensee without the witness' prior consent. For witnesses not covered by an existing confidentiality agreement, counsel will disclose the relevant affidavit once the agreement is signed.

the public record and the NRC staff has agreed. But a May 31, 1984, Pullman memorandum intended for limited distribution admitted, "A-307 bolts with the heads removed are NOT acceptable." Pullman took steps to "prevent recurrence of this discrepancy . . ." (Attachment 7, p. 9, Exhibit 2) (emphasis in original). Unfortunately, prevention is not a cure when the plant is completed and about to operate. Nothing was said about testing or replacing the unacceptable bolts, which remain throughout both units and constitute an unknown safety hazard. The corrective action was carefully limited "[t]o prevent recurrence of this discrepancy." (Id.)

3. Underground quality control program. Witnesses have disclosed major quality control inspection programs that had the authority to reject work but not to write up the deficiencies on formal reports. They could only write notes on the process sheets. They also were stripped of the authority to follow through on monitoring resolution of problems they exposed. These restrictions gut the minimum quality assurance program standards in 10 CFR 50, Appendix B. PG&E has protested that the inspections were for economic purposes only. But safety-related work was involved, and no other "safety" inspections were scheduled. (Attachment 10, at pp. 1-2). In February 1984, management effectively abolished one such unit -- QC-1 -- after it had rejected work at a 40% rate. (Attachment 11, at pp. 8-10.) No one knows how many "ghost violations" exposed by the minor league QA departments ever made it into the formal reporting system.

4. Restrictions on quality control inspections. A practice from the last few years has been strictly enforced over the last few months. Inspectors are not allowed to write up problems on "old work", which means before October 1, 1982. The significance is that work during 90% of the plant's life has been officially removed from the QC program, regardless of its condition. The policy has been applied to prevent reports and repairs on some of the most glaring hardware deficiencies, such as indications of cracks in structural steel. (Attachment 1, at pp. 3-4; Attachment 7, at p. 7; Attachment 10, at pp. 1-2; Attachment 11, at pp. 16-18; and Attachment 13, at p. 4).

In some cases, physical restrictions obstructed the QC inspectors from producing reliable results. As one witness pointed out, it was "impossible" to accurately inspect welds when "at least 98% of 'existing' welds at Diablo" were covered with paint before the inspection. (Attachment 12, p. 1).

5. Quality of material. A new sample of tube steel used to support safety-related systems has just been received from the site. The material is cracked throughout most of the sample. A Cal Poly analyst assessed its quality as follows: "Material quality was extremely poor as indicated by the gross seam with massive inclusions . . . The gross nature and combination of defects are consistent with foreign manufacture or the lowest quality domestic product, sold as 'seconds.'" (Attachment 2, at pp. 2-3, 5). Building Diablo with bargain basement steel could create a significant safety hazard, particularly during the stress of an earthquake.

6. Hydrostatic tests. These high pressure tests check whether the plant can meet the margin of safety claimed by the design. Water is run through the piping lines at higher pressures than during normal operations. Unfortunately, a new review demonstrates that the design



margins are still a theory; not all have been tested to the limits. An engineer just completed a review of test records that exposed unacceptable pressure variations which should cause 60% of tests in Unit II to fail despite prior "review and approval" by PG&E and the NRC, among others. The underpressurizing averaged 10% but frequently reached 200-300 percent and ranged up to 1000% below minimum test levels. Most of the errors occurred in tests from 1976-80. Unit I has not yet been reviewed for similar failings, but the tests were run in the same manner for both units. (Attachment 10, at pp. 18-20).

## B. Character and Competence

7. Records falsification. Over the last several months, management has instructed quality control (QC) inspectors to "verify" on paper the identification and traceability history of hardware by copying the numbers from the field. Unfortunately, the paperwork is supposed to exist first, to verify that the right hardware was installed in the right location. Similarly, during this time frame piping process sheets have been changed after-the-fact to eliminate contradictions in the paperwork that were up to Revision 6 for problematic work, but suddenly were "born again" as Revision "0". (Attachment 7, pp. 12-13, 18-19).

8. Material false statements. PG&E has become more arrogant recently. It has stopped responding to allegations through sworn affidavits from engineers. Instead, company lawyers are asserting PG&E's denials in April 30 and May 18 briefs. There has been a direct relationship between this development and new allegations of 100 misleading or material false statements. The disputes center around PG&E's insistence that management either was ignorant of or acted promptly to correct QA problems. Fortunately, the whistle-blowers are the "living history" to challenge the official version, and many saved copies of documents the company says did not exist. The alleged false statements focus on highly significant issues for plant safety, such as the lack of any consistent system of weld symbols. These are the language of welding, and without a uniform system welders must work blind. (Attachment 10, at pp. 3-5, 8-9, 12-13).

In addition to recent false statements, GAP has obtained new evidence of earlier false statements. Contrary to both PG&E and the NRC staff's public disavowals of a 1977 Nuclear Services Corporation (NSC) audit of construction QA, new evidence indicates that in 1978 PG&E and contractor Pullman Power independently confirmed both the key audit findings and the resulting hardware deficiencies. Like the NSC audit itself, these findings were not reported to the NRC. (Attachment 4, at pp. 37-40).

9. Retaliation and harassment. Reprisals and attempted intimidation have intensified to the point where the hotline on-site receives steady complaints of these criminal offenses. PG&E assigned Pullman's QA manager to respond to the charges. Unfortunately, he was the target of the reprisal charges. Management has dismissed QA personnel who refused to cooperate by marking work packages "QA accept pending resolution of comments". There is no such category in the QA program for provisional acceptance. (Attachment 7, pp. 14, 18, Exhibits 5-6).

10. Management ignorance of codes and procedures. Basic professional codes and Atomic Energy Act quality assurance standards (10 CFR 50, Appendix B) continue to be irrelevant at Diablo Canyon for significant portions of the work. Even today, the program for pipe rupture restraints -- which keep heavy steel piping from swinging during an earthquake -- is not based on 10 CFR 50, Appendix B nor any national standard. (Attachment 4, at p. 36). As management explained to one confused engineer, "We're not on a job where we have the luxury of knowing what codes we're working to." (Attachment 11, p. 21).

### C. Design Control and Quality Assurance

11. Loopholes in corrective action. The corrective action program has too many loopholes to reliably verify whether or not Diablo Canyon passes minimum legal standards for the engineering work. For example, PG&E has not agreed to perform calculations, or any specific methodology, for its review of "Quick Fixes" that changed the design on-the-spot in the field. There are some 15,000 Quick Fixes which can be found now, and many more that have been lost. No one knows how many of these Quick Fixes have been marked on the as-built drawing, or their effect on the integrity of the design. Normally the design is backed by specific engineering calculations to prove the strength of the structure. In the Quick Fix program, however, field engineers changed the design on "hunches" after paper-work review, only "rarely" going to the field. On occasion a Quick Fix would be signed off without the engineer even looking at the paperwork. (Attachment 7, at p. 13; Attachment 11, at pp. 6-7; Attachment 14, at pp. 8-10). These all must be reviewed, calculated and tracked to drawings, merely to reestablish the normal system of checks and balances on the design of a nuclear plant. The staff has not yet made a commitment to enforce that standard, even after PG&E was caught skipping the minimums the first time.

PG&E also has not committed to examining all relevant loads and stresses that the plant must be able to withstand. Factors missed the first time, such as the weight of the structure and relevant loads from all directions, may be missed again as a result. (Attachment 14, pp. 11-13, 16).

12. Changing the design through memoranda. Overwhelming evidence and examples have been received to support this earlier allegation, which PG&E also has strongly denied. Similar to the Quick Fix drawbacks, changing the design informally sacrifices the normal system of engineering safeguards. It got worse, however. The memoranda were not consistently controlled through document numbers or distributed to a consistent audience. To make matters more confusing, the memoranda contradicted each other. The bottom line is that knowledge about the design is erratic, contradictory and lost in an unknown number of instances. (Attachment 11, at pp. 2-3, 21).

13. Inaccurate drawings. All of the design "reverification" work is based on the assumption that plant drawings are accurate. The engineers base their calculations on the design drawings. Equally significant, operators rely on their own drawings to respond to emergencies. Unfortunately, the drawings already are suspect due to an unknown number of Quick Fixes that were never incorporated. Further, contrary to NRC reassurances, the design and operator drawings still contradicted each other for safety-related systems last

December, after fuel loading. Management ordered the engineer who found the problem to stop writing reports on the conflicts. (Attachment 10, at pp. 12-13). As a result, the engineers and operators may base critical safety decisions on inaccurate data.

14. Undersized weld design. Contrary to PG&E's vehement denials, the facts continue to demonstrate that the radii of tube steel were up to 100% smaller than assumed in design calculations. This translates into much smaller welds, and correspondingly less bonding strength, than PG&E counted on to hold the welded joints in place. The latest evidence again comes from a sample that empirically rebuts PG&E's assertion. The witness who raised this issue, Mr. Stokes, knows that PG&E's statement is false; he measured the sample. (Attachment 14, at 1-3, and related Attachment 1).

15. Sacrificing the post-TMI reforms. Many of post-TMI reforms, including safeguards to isolate twin reactor units, have been officially waived at Diablo Canyon or postponed for a year until the next fuel loading. (Attachment 9). Two factors suggest that this policy could represent Russian Roulette for the public -- (1) the unknown condition of Diablo Canyon; and (2) TMI's inability to make it to the second fuel loading.

## II. QUALITY ASSURANCES BREAKDOWN WITHIN THE NRC STAFF

The new developments and evidence summarized above raise two compelling questions: (1) Where has the NRC been while all these abuses were happening? (2) Why is the NRC currently in a framework of wrapping up the loose ends for an imminent licensing decision, when the evidence of a QA breakdown and coverup is mushrooming? The scope of employee disclosures at Diablo Canyon is unprecedented in the nuclear industry.

Region V's efforts to date have been counterproductive to developing a free flow of information about potential safety hazards. Witnesses interviewed by Region V and represented by counsel consistently have expressed disillusionment and, to varying degrees, reluctance to renew the contacts despite the desire to obtain NRC enforcement action.

### A. Suspect Judgment

The March 26 assessment by Region V to the Commissioners that water in Component Cooling Water lines did not affect weld quality has been greeted with derisive amusement by QC inspectors on-site. They did not believe the reassurance, because the welding beads froze on contact with the piping. (Normally, the metal should be hot enough for the welding to stay molten.) Even Pullman field supervisors warned that it "requires a value judgment . . . if and when an accepted weld can be made on a line full of water." That is a shakey basis for decisions affecting public safety. (Attachment 1, at pp. 1-2; Attachment 7, at p. 11, and Exhibit 3).

Similarly, even Pullman's QA management has now rejected a practice which the NRC had blessed -- the use of welded studs fashioned from A-307 bolts with the heads removed. (Supra, at pp. 2-3).



B. Sitting on the Evidence

Inconsistencies in the quality of staff review are most striking in response to allegations on the Quick Fix program. In January, whistleblowers described the improprieties of Quick Fix to Region V, which sat on the evidence. (Attachment 7, p. 16). Apparently Region V dismissed Quick Fix as one of those insignificant repetitive problems that didn't have to be addressed. By contrast, in February Mr. Stokes disclosed the issue to Mr. Yin, who promptly followed-through and confirmed one of the worst phenomena of the Diablo Canyon QA breakdown.

Similarly, in December the NRC staff dismissed a cracked spring can attachment because it was "only" on a Class II pipe system. Had the staff bothered to follow through, it would have learned of 25 other defective spring can attachments on-site. Hopefully, the staff will find this defective work more relevant, or at least keep looking until it knows there is no safety problem.

In some instances, the staff is inexcusably tardy. For example, the staff has not yet had initial interviews with potential witnesses whose affidavits were filed on February 2, 1984, over four months ago.

C. Inaccurate Factual Conclusions

At a May 1984 meeting with allegers, PG&E assured the relevant witness that discrepancies between design drawings and operator drawings had been cleared up long before the operator drawings were used. The NRC's credibility disintegrated when the witness checked his records and confirmed that the contradictions persisted after fuel loading. (Supra, at ). Further, the NRC was mistaken that operator drawings are not used until they are updated near the end of construction. They have not been updated yet in Unit II but are being used to inaccurately guide the hydrostatic tests. Again, it would be foolhardy to assume that Unit I is any better.

D. Breaches of Confidentiality

On three occasions since January, the NRC staff has revealed the identity of confidential witnesses. In one case, it was due to sloppiness. Rather than identifying the whistleblower by name, Region V identified him as the author of a specific QA report. In two other cases the betrayal was an inherent outgrowth of the staff's new policy to turn affidavits over to the utility. As a practical matter, this makes anonymity impossible if a witness describes an issue s/he raised on-site in sufficient detail for the staff to follow-up adequately. (See, e.g., Attachment 17, at p. 3).

There is no question that the issues emphasized in this petition -- quality assurance/control (workmanship), patterns of retaliation, and character and competence -- must be fully resolved on the record prior to any licensing decision on commercial operation. This is clear from traditional and current staff enforcement actions, Commission orders, and case law. The staff's turtle-like pace in addressing these issues, compared with the Commission's plans for an imminent licensing decision, suggests that the foundations of the Atomic Energy Act are about to be sacrificed at Diablo Canyon.

The staff still has not ascertained the effects of any quality assurance violations. The predominant feature of the staff's response has been paralysis. The staff still has not had initial interviews with two witnesses from GAP's initial February 2 disclosure. The Office of Investigations has not yet begun interviews with the first GAP whistleblower, Charles Stokes, on the evidence he submitted in December of documents destruction and falsification.

The staff has only had follow-up interviews on 44 allegations, including 30 by Mr. Yin and others on the Stokes charges. The staff only has conducted follow-up interviews on 14 allegations of construction quality assurance violations. At this pace, it will be well into the next decade before the staff even gets back to the whistleblowers on their current allegations.

Yet it has long been Commission and staff policy that a license cannot be sustained on the basis of missing, voided or improperly-dispositioned quality assurance reports; suspect qualifications for welders and inspectors; deficient weld procedures, and inadequate oversight of vendors. See, e.g., Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Power Station, Unit No. I, CLI-82-33, 16 NRC (November 12, 1982); June 13, 1984 letter from Darrell G. Eisenhut to J. McCain, "Subject: Waterford 3 Review" (Docket No. 50-382).

At Diablo Canyon the staff has downplayed the significance of charges that the licensee violated its own program. But even if the specific effects of QA violations are not hazardous, "demonstration of a pervasive failure to carry out the quality assurance program might well stand in the way of the requisite safety finding." Union Electric Company (Callaway Plant, Unit I), ALAB-740 (September 14, 1983), slip. op. at p. 2. As the Appeal Board reaffirmed on June 11, quality assurance program shortcomings can preclude "a finding of reasonable assurance that any and all serious construction infirmities have been detected and rectified." Commonwealth Edison Company (Byron Nuclear Power Station, Units I and II), ALAB-770 (May 7, 1984), slip op. at pp. 21-2.

In this regard, the absence of corporate character and competence has long been an absolute bar to approval of an operating license. Houston Lighting and Power Co. (South Texas Nuclear Project, Units I and II), CLI-80-32, 12 NRC 281 (1980). This principle recently has been affirmed in the Three Mile Island restart proceedings.

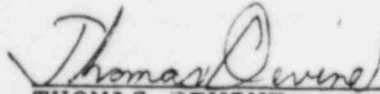
Finally, patterns of harassment and retaliation fundamentally compromise confidence in results from licensee's quality assurance program. Callaway, ALAB-740, supra., slip. op. at p. 43. This principle recently has been upheld in the Commanche Peak proceedings.

At Diablo Canyon, the Commission staff is not yet close to learning the scope or effects of specific program violations. The Office of Investigations is early in its investigation of retaliation, false statements and other mandatory criteria to judge the program. Motions to review these issues for the first time in public hearings have not yet been granted, nor does the Commission's decision-making schedule allow for reopened hearings.



Under the Constitution, the citizens of central California have a due process right to full answers on these issues. The Mothers urge the Commission to restore accountability to its own program at Diablo Canyon.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Thomas Devine", is written over a horizontal line.

THOMAS DEVINE

Counsel

Mothers for Peace

Index of Attachments for June 21, 1984,

GAP Disclosure on Diablo Canyon

- Attachment 1 - June 7, 1984 confidential affidavit
- Attachment 2 - June 4, 1984 affidavit of Walter B. Clark
- Attachment 3 - May 22, 1984 affidavit of Thomas Devine
- Attachment 4 - June 5, 1984 affidavit of Harold Hudson
- Attachment 5 - June 1, 1984 affidavit of Larry (Doc) Kinney
- Attachment 6 - June 7, 1984 affidavit of Steven Lockert
- Attachment 7 - June 7, 1984 confidential affidavit
- Attachment 8 - May 22, 1984 affidavit of Richard D. Parks
- Attachment 9 - June 5, 1984 affidavit of Richard D. Parks
- Attachment 10 - June 7, 1984 confidential affidavit
- Attachment 11 - June 5, 1984 confidential affidavit
- Attachment 12 - June 7, 1984 confidential affidavit
- Attachment 13 - June 1, 1984 affidavit of Charles C. Stokes
- Attachment 14 - June 1, 1984 affidavit of Charles C. Stokes
- Attachment 15 - May 25, 1984 confidential affidavit
- Attachment 16 - 6/9/84 memo from Harold Hudson
- Attachment 17 - June 14, 1984 letter from Thomas Devine to Cong. Panetta
- Attachment 18 - March 14, 1984 memo from Harold Karner/Skip Cornish to  
all QA/QC and Engineering personnel at Pullman Power  
Products

1  
UBC  
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SUBJECT: Diablo Canyon 3" x 3" x 1/4" steel tubing analysis.

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BACKGROUND:

I have a BS Degree in Metallurgical Engineering (1967, California State Polytechnic University, San Luis Obispo.)

Worked in the nuclear industry as a weld development engineer on prototype nuclear fuel assemblies. (Douglas United Nuclear, Richland, Washington.)

Currently I am with the Welding Option of the Engineering Technology Department (School of Engineering and Technology) at California Polytechnic State University, San Luis Obispo, Calif.

DESCRIPTION OF FACTS:

On May 29, 1984 I was given a 1-3/4" piece of 3" x 3" x 1/4" square steel tubing from Diablo Canyon that was reportedly from a lot of material used to fabricate pipe hangers. It had an identification marking, P.O. 14817.

I was asked to assess the overall quality of the material.

The sample was visually examined first, followed by grinding and etching for macro examination. Finally the sample was dye penetrant inspected.

FINDINGS:

Visual:

1. Extremely wide variation in corner radii, external and internal. (Fig. I & II)
2. A seam visible midway between the internal and external surfaces, extending most of the way around the piece. (Fig. I & II)



3. The surface is somewhat rough, lightly rusted and coated with what appears to be gray primer.

#### Macro Examination:

1. A seam was shown to extend around the entire piece for its full length. The seam was very close to midway between the inside and outside surfaces. (Fig. I & II)
2. The seam included a considerable quantity of inclusions for approximately 75% of it's length. (Fig. III)

#### Dye Penetrant Inspection:

1. Dye penetrant inspection revealed a massive discontinuity that extended approximately 75% of the distance around the piece, and that there was little if any continuity in this region. (Fig. IV)

#### Dimensional:

1. Thickness varied from .231 to .242 in. Nominal thickness is .250. (Fig. V)
2. Radius variation was very large, from approximately  $\frac{1}{4}$  R. to  $\frac{4}{8}$  R. with none of the radii being uniform either internally or externally. (Fig. V)

#### ASSESSMENT OF QUALITY:

Material quality was extremely poor as indicated by the gross seam with massive inclusions.

Overall fabrication technique was very poor considering the gross dimensional variations and material discontinuities.

SOURCE OF MATERIAL AND COMPARISON WITH U.S. PRODUCED MATERIAL:

It is my opinion that the types and severity of defects in this material are consistent with those found in various foreign produced materials. The dimensional and material related items noted above are often encountered in foreign materials that are available at bargain prices.

The gross nature and combination of defects are consistent with foreign manufacture or the lowest quality domestic product, sold as 'seconds'.

Domestic mills generally are noted for producing high quality material, and would not normally produce material with such a combination of significant defects. This sample is not representative of even average quality domestic steel.

EXTENT OF CONDITION:

Dimensional variations undoubtedly exist throughout the entire lot of material from which this sample was obtained. Dimensions are inherently related to the rolling process. If the rolling process is adjusted to yield unacceptable dimensions, then the unacceptable dimensions will continue to be produced.

Steel quality within a heat of material will vary considerably. This particular piece of material is of very poor quality. It could be expected that some of this heat would be of better quality but also that some could be worse.

WELD STRENGTH:

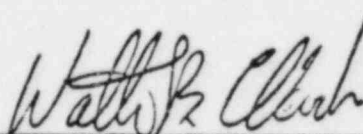
It is my understanding that this type material is typically welded to other structural members using simple fillet welds (not full penetration).

WBL

If this piece of material were placed in tension with simple fillet welds the load bearing capacity would be seriously reduced because of the effective reduction of cross sectional area due to the seam in the material.

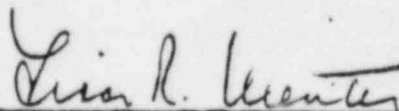
If the seam were located closer to the surface, which it very possibly could be, in other pieces of material, the load bearing capacity would be even further reduced.

I have read the above four page document and it is true and accurate to the best of my knowledge.



Walter B. Clark

Subscribed and sworn to before me this 4 day of May, 1984.



Notary Public in and for the County  
of San Luis Obispo, State of  
California



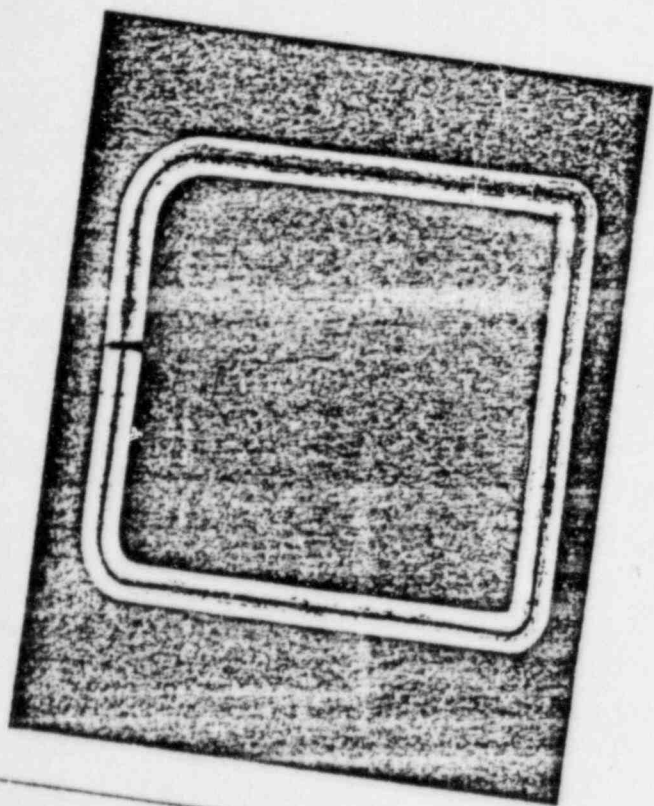


Figure I

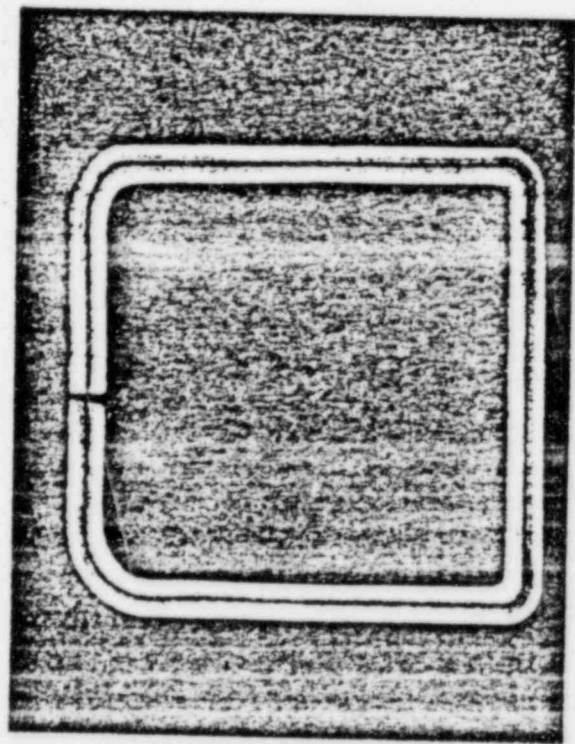


Figure II

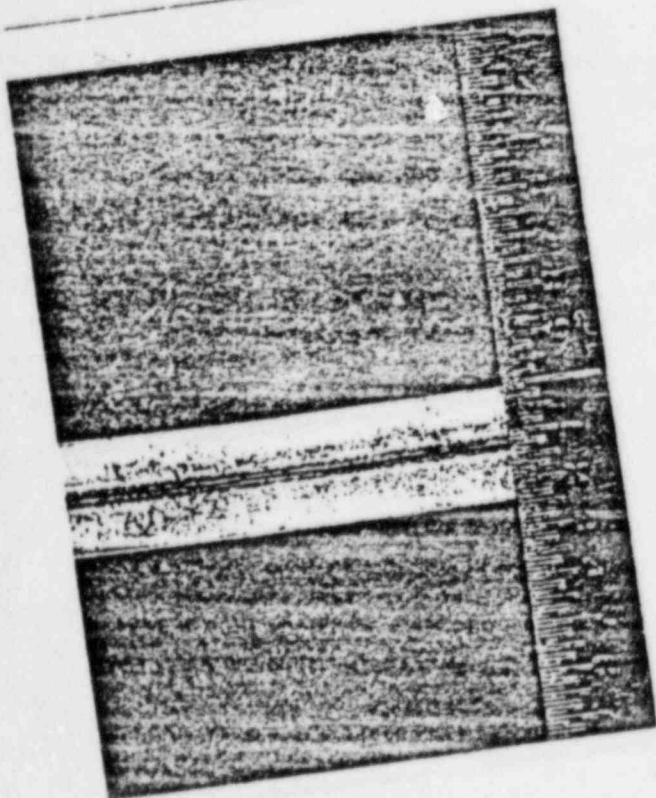


Figure III

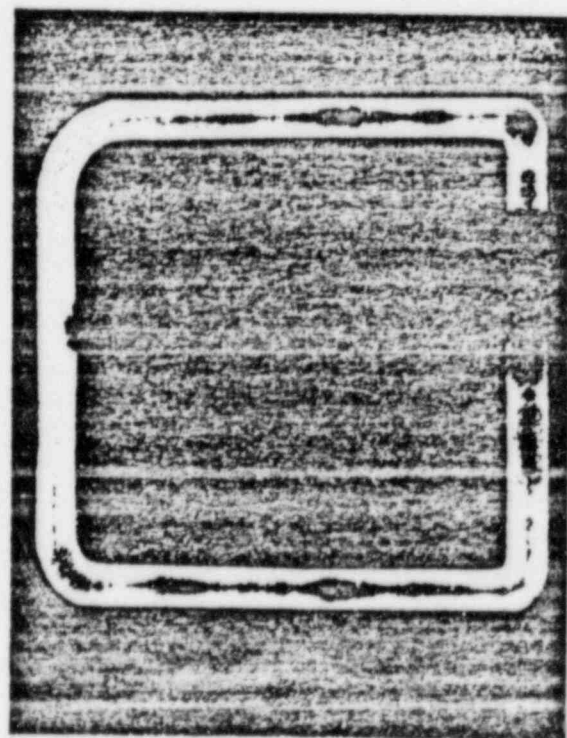


Figure IV

Figure V.

