Supplementary Attachment "D"

Cardinal
INDUSTRIAL PRODUCTS CORPORATION

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LAS VEGAS, NEVADA 89118

January 4, 1985

Mr. Gary C. Zech, Chief
Vendor Program Branch
Division of Quality Assurance,
Safeguards, and Inspections Programs
Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Docket No. 99900840/84-01

Gentlemen:

We want to take this opportunity to formally update the Commission on the status and progress of our Action Plan. Attached please find Cardinal's ACTION PLAN-INTERIM REPORT #1. As you will see from the Report, we have made substantial progress in completion of our Action Plan commitments. We have also statistically analyzed the results from our implementation to date, and have suggested certain modifications in the Action Plan which we believe will improve it's overall timeliness and effectiveness.

We look forward to your review and comments on our Report and will continue to diligently honor our commitments to the Commission and customers to fulfill all applicable requirements for current and past nuclear business. As the proposed amendments in the Action Plan will involve changes in the allocation of our resources, we would appreciate your response as soon as possible.

Sincerely,

M. J. Donovan

M. J. Donovan
Chairman

1/04/84

CARDINAL INDUSTRIAL PRODUCTS
ACTION PLAN
INTERIM REPORT #1

INTRODUCTION

This report will provide interim information concerning the implementation of Cardinal's Action Plan and proposed amendments thereto. We have substantially completed the Agency Formalization process with the overseas trading companies that will insure the timely and accurate pass down of Cardinal's purchase order requirements to the appropriate subcontract vendors.

We have also substantially completed our Subcontractor Validation commitments. Even though there were some deviations noted with respect to Quality Assurance requirements, Cardinal's materials have been in compliance with chemical and mechanical specification requirements.

We have also implemented Cardinal's Monitoring/Surveillance Program of overseas vendors. Cardinal's Monitor is a bilingual foreign national with a degree in metallurgy and over 20 years of active experience in metals and heat treating. Although we envisioned monitoring as being limited to control of heat treat, we have also used our Monitor to insure that other portions of our subcontractor's Quality Assurance Programs are properly implemented for Cardinal orders.

Cardinal has also partially completed it's commitments concerning the review of Cardinal's nuclear certifications. To date this review has shown that, even though there may be technical noncompliances with certain of the Quality Assurance requirements, there are no significant problems with the material which Cardinal has certified. Moreover, after reviewing over 1,200 certifications and conducting hundreds of verification tests prior to accepting material for use, we have issued only 14 notices under 10 CFR Part 21 and none of these notices questions the material's compliance to the specification chemical and mechanical requirements.

Because of our favorable experience concerning the adequacy of Cardinal's materials, we are proposing to modify our Action Plan to limit the Certification Review to those orders with the highest quality requirements (ASME size included material), and to replace the review on other materials with a testing/material verification program. If this testing confirms our initial experience of not having a single product failure with respect to chemical and mechanical requirements, we feel confident that the balance of Cardinal's materials will meet design requirements.

AGENCY FORMALIZATION (TRADING COMPANIES)

Cardinal has completed the agency formalization of it's three principle trading companies. Each of these companies has been surveyed and has acknowledged, in writing, their acceptance of Cardinal's Agency. They are committed to passing down Cardinal's purchase order requirements to the final subcontractor in the "channel". As part of each purchase order the Agents will certify on a standard Cardinal form that the requirements have been passed down through the "channel" and the method they used to transmit these requirements. Sample purchase orders and returned agency certifications are available for inspection to verify implementation.

Cardinal has one agent which is a captive of an overseas subcontractor that has not yet been formalized. This agent is used only for purchase orders involving the parent overseas subcontractor who has been used infrequently by Cardinal. Even though the agency formalization has not been completed, Cardinal visited the parent overseas subcontractor's factory and verified that the purchase order requirements, on a recent purchase order, were transmitted. The only reason this formalization has been delayed is that there was a change in U.S. personnel which was completed shortly before Christmas, and Cardinal wanted to wait for the new management personnel before completing the process. This agent will be formalized on or before April 30, 1985. If any orders are placed through this agent in the interim period Cardinal will have our Monitor verify that the requirements were transmitted.

SUBCONTRACTOR VALIDATION AND ON-GOING MONITORING/SURVEILLANCE PROGRAM

To honor it's commitments Cardinal has, since August, 1984, completed two overseas trips involving approximately 800 man hours of overseas site work. Personnel involved in the subcontractor validations have included internationally recognized survey firm's representatives acting as lead auditors, Cardinal auditors qualified as a lead auditors under ANSI N45.2.23 and Cardinal auditors in training. The audit teams were joined, as necessary, by the Cardinal Monitor. All validations included a qualified translator. In addition to the validations which were performed, Cardinal also conducted requalification surveys for many of the vendors on its approved vendors list. In total, 18 companies were validated, surveyed for requalification, audited and/or visited. Auditor qualifications and survey reports are available for inspection to verify implementation.

The only portion of Cardinal's Validation work which has not yet been completed involves carbon steel washers (melting, rolling, stamping, heat treating and testing). This work will be completed in accordance with the Action Plan during Cardinal's next overseas survey/audit trip tentatively scheduled for March/ April 1985.

The findings of the validation and requalification efforts can be summarized by type of vendor as follows:

Raw material producers/mills-In general the validations and surveys verified that the mills have quality assurance programs that meet the applicable requirements of Cardinal's Q.A. program and the Code. Traceability is maintained, chemistries are determined with calibrated equipment and records are retained and retrievable upon request.

Heat treaters A)-Those organizations who perform heat treating as their only business were found to be in compliance with applicable requirements of Cardinal's Q.A. program and the Code. B)-The organization that was performing heat treating as a side line to a principle business (i.e. chain manufacturing) was found to have problems in the form and/or content of his quality program. Calibration records were not generally available and/or equipment may have been out of calibration. Records--preparation and retention also had deficiencies. However, products heat treated by this vendor have passed specification requirements for mechanical properties, suggesting satisfactory process control for Cardinal orders. C)-Those organizations that were performing heat treating as part of other fastener production operations showed mixed results. Some were complying with applicable requirements while others had program deficiencies. The deficiencies generally involved calibration and records retention. Documentation systems to maintain traceability also required strengthening. Despite these problems, products heat treated by these vendors, for Cardinal, have met specification mechanical requirements.

Cold drawers A)-Those organizations perfoming cold drawing as their principle business were found to be complying with applicable requirements. B)-The organization that was performing cold drawing as part of a production process involving bar products had program deficiencies. Even with these deficiencies, traceability was maintained by use of mill tags showing size, grade and heat number. Records retention and retrievability procedures required changes.

Final subcontractors-Results for these vendors were also mixed. Even though it appears that traceability was maintained, most had program defficiencies. Principle deficiencies were in control of heat treat described above and records retention and retrieveability. In one case of a screw machine company, the operations were controlled by verbal communication and could not be audited. Because of the small size of this subcontractor and the unusually high integrity of the owner/manager, Cardinal believes his work met material specification requirements. This has been supported by subsequent product testing.

Mechanical testing A)-The organization performing mechanical testing as its only business was found to be complying with applicable requirements. B)-Those organization that were performing testing as part of their internal production operations showed mixed results. For these organizations testing equipment was generally calibrated but problems were noted with documentation and/or records retention. In a few cases we could not audit whether they were performing the proper number of tests but those tests performed met specification requirements. We also confirmed the charpy impact testing problem raised by the NRC (discussed more fully later in this report). All charpy verification tests, conducted by Cardinal, have met specification requirements.

General summary-As indicated above problems encountered with the validation and requalification principally involved control over heat treat, records retention, charpy impact testing and in a few cases programs that were not in sufficient detail and/or not fully implemented to verify traceability. None of these problems appear to have affected product compliance with mechanical or chemical requirements.

Regarding control of heat treat, Cardinal has taken necessary measures, including monitoring of heat treat on current orders and re-heat treating and/or re-testing, as necessary, of existing stock to insure that all requirements are met prior to use.

As was discussed in Cardinal's responses to the NRC Inspection Reports, we found that charpy impact tests were in many cases not run per the full requirements of ASTM A370 and ASME Section III, Paragraph NX2311. As previously reported Cardinal has completed verification of all B7 and L7 materials which were in stock (Attachment 1). All re-tests have fully met specification and Code requirements. Additionally we have found there are suspect charpys on SA194 Grade 6 nuts and some heats of SA194 Grade 7 nuts. These products will not be used on future orders requiring charpy impact testing unless a re-test verifies that the results are fully in compliance with the requirements.

On all current overseas orders Cardinal is performing the impact testing at our facility. If any of the above mentioned Grade 6 and/or Grade 7 nuts with questionable charpys cannot be verified, customer notice will be made in accordance with 10 CFR Part 21 and Cardinal Standard Practice CSP 17.003. Most customer purchase orders for these materials did not require charpy testing and will not be affected.

With regard to records preparation, retention and retrievability, it can generally be said that records were prepared. The problem with many of the overseas subcontractors, is that

records were prepared and retained by work center rather than by order. This is the best approach to track efficiency, in which all of Cardinal's overseas subcontracts are vitally interested. To retreive this data it is necessary to not only know the work centers through which the material passed, but also the approximate date at which this took place. Cardinal has instituted controls with vendors having this problem which insures that copies of the work center detail are prepared and filed in a Cardinal order file to be verified by Cardinal's Monitor. These records will also be a matter of Cardinal's future overseas vendor audits.

In some cases quality systems could not be satisfactorily audited because of the records retention problem mentioned above, and that no quality orders were being processed for Cardinal. In the few cases where traceability was questionable, Cardinal will not use existing materials in stock for Code orders and will insure that satisfactory controls are implemented prior to placing new orders. If this cannot be done, the vendors in question will not be used and will remain off Cardinal's Approved Vendors List.

As we were not able to validate some subcontractors, Cardinal has amended it's approved vendors list to drop those vendors with serious problems and has placed restrictions on most of it's other overseas vendors to insure full compliance with applicable quality requirements of Cardinal's Q.A. Program and the Code. It should be kept in mind that material from the raw material producers was satisfactory and in most cases traceability was not an issue. Cardinal is re-working and/or retesting materials in stock to insure full compliance prior to use. If this cannot be done, the material will not be used for Code orders. We have no knowledge of any Cardinal material that has not met required chemical and mechanical properties.

We are pleased to report that our Monitoring program is now in place and functioning. Cardinal Standard Practice CSP- 8.006 describes how monitoring is to be performed. Cardinal's Monitor has received necessary training and is making a significant contribution to insure that all applicable quality requirements are met. We have used our Monitor not only to control heat treat but also to collect and verify data on calibration and/or traceability for some materials in stock. The Monitor's qualifications, training record and reports are available for inspection to verify implementation.

Possible customer notifications, which may be required by 10 CFR Part 21, resulting from the above found conditions will be fully discussed in the remainder of this report.

CERTIFICATION REVIEW

As part of its Action Plan, Cardinal agreed to review all certifications for materials used in nuclear orders. To date we have reviewed, either in part, or in total over 1,200 certifications out of our total commitment of 18,700. The review criteria adopted by Cardinal, involved answering approximately 30 detailed questtions all of which had to be answered yes or else the certification would be marked for additional in-depth review and/or testing. Using this most restrictive acceptance criteria we were finding that progress was slow in achieving our commitment. Continuing on the same basis would involve a time period of approximately five years which may not be responsive to potential problems if any. We also found that after reviewing the 1,200 above mentioned certifications we issued only 14 notices to customers under 10 CFR Part 21 (relating mostly to inadvertent processing oversights and/or program non-compliances).

Realizing that most of Cardinal's nuclear orders did not invoke NCA3800 for size included materials, certification approval can be expedited by applying the size exclusion rules of NX2610, and/or applicable requirements of 10 CFR 50 Appendix B, ANSI N45.2 and/or 10 CFR Part 21. As part of our Action Plan we also submitted CBP 8.003 as an acceptance criteria for orders not invoking ASME Section III, but requiring either 10 CFR 50 or ANSI N45.2. We also have a significant number of orders that require a quality assurance system and/or" that the material is nuclear safety related" but do not give specific quality requirements.

Realizing the above, we can prove by example that most of the quality issues raised for orders not involving ASME size included materials can be answered. During our annual audit by Bechtel Power Corporation, a specific review was performed for Arizona Public Service at Palo Verde. As part of Bechtel's audit they applied the most restrictive criteria to orders involving 193 items. Their review indicated that there were 88 deviations from the requirements. After performing a detailed review of all 88 deviations, 80 of them were resolved by either clarifying the review criteria and/or making minor amendments to Cardinal's certifications. Four of the remaining items had questions as to purchase order requirements which were not detailed enough to decide whether a deviation existed. The last four had minor certification problems-Two of which could be solved by NX2610, one with an insufficient number of tests (the tests run were all good) and one with a machine specimen tensile test being run rather than the required full size tensile test (the machine specimen test was good). None of these deviations revealed a material problem.

In addition Cardinal has been running independent testing as part of a controlled inventory material retesting program. To date we have performed over 360 tests under this program and have found that all material complies with the applicable chemical and/or mechanical requirements of the material specification.

MODIFICATION OF CARDINAL'S ACTION PLAN:

A) CERTIFICATION REVIEW

Using MIL-STD-105 AQL 1.5 as a guide, we can say that 360 verification tests run, without a failure on over 130 heats, provide a 95% confidence level for up to 35,000 heats of materials. As Cardianl has not used 35,000 heats for nuclear orders we can surmise that Cardinal's materials comply with the specifications. The detailed review will, however, continue for all ASME Section III size included materials. Even though Subsection NF allows size exclusion through 2" diameter for bolting, Cardinal will review all orders and certifications for ASME Section III bolting and bar materials over 1" diameter. The same review and acceptance criteria, from the Action Plan, will continue for these size included items. This review will highlight any and all problems with certifications on ASME size included orders including traceability, vendor approval, inspection, chemical and mechanical testing, charpy impact testing (only required by NX2311 for sizes over 1") and nondestructive examination including magnetic particle, liquid penetrent and ultrasonic (only required by NX2580 for sizes over 1"). We will also determine if a sufficient number of tests and of the right type were conducted. Any deviations resulting from this review will become a matter for possible re-testing and amending certifications and/or issuing notice under 10 CFR Part 21.

B) MATERIAL VERIFICATION

Cardinal will immediately start a material verification program of overseas subcontractors who's Quality Assurance Programs had deficiencies. Excluded from this verification program will be the raw material producers/mills and other overseas subcontractors who's programs were properly validated. The steps in the material verification are as follows:

1. All procurement document files will be pulled for the overseas subcontractors who's material is to be verified.
2. The procurement documents will be sorted by final subcontractor and product type to make a "category". "Final subcontractors" are defined as the last subcontractor before Cardinal's agent in the "channel".
3. Each category will be sorted by heat and diameter. Each unique heat and diameter will be called a "combination".
4. Cardinal's Quality Assurance Department will review each category and/or combination to determine if they have been, or may be used on nuclesr orders.
5. Each combination selected from 4 above will be compared to controlled inventory records to determine if any of the material is in controlled inventory. All such material will be called a "stock combination".
6. Each category having stock combinations will be reviewed against MIL-STD-105 AQL 1.5 to determine the number of stock combinations which must be verified by testing to insure a 95% confidence level.

7. The number of stock combinations for each category to be verified from 6 above will be tested in accordance with the latest year of the specification as follows:
   a) Mechanical testing-All mechanical properties of the material specification will be verified with the exception of charpy impact tests (discussed more fully below). Unsual mechanical tests, such as stress rupture for SA453 Grade 660 material, will only be verified if such test results were certified by Cardinal on a nuclear order, and Cardinal based it's certification upon test results submitted by a subcontract vendor who's quality system was questionable.
   b) Chemical testing-The chemical properties of the material specification will be verified for all alloy, stainless and non-ferrous materials by product analysis. Carbon steels will not be verified because chemistry should have no affect on the intended use of the product.
8. If any of the testing from 7 above fails to meet specification requirements, two re-tests of the failed attribute/s will be made. If both re-tests are good the initial test will be disregarded. If either or both of the re-tests fail, the material will be deemed to be in non compliance with the material specification and will be a matter for notice under 10 CFR Part 21.
9. If the product verification of the stock combinations meets the requirements of MIL-STD-105 AQL 1.5, the category will be accepted with no further testing or review.
10. If the product verification of the stock combinations has more failures than is allowed under MIL-STD-105 AQL 1.5 the category will receive second level testing for verification. "Second level" testing will consist of taking all combinations (versus stock combinations) for the category and again consulting MIL-STD-105 AQL 1.5 to determine the total number of combinations in the category to test for a 95% confidence level. Affected customers will be contacted to return samples of non-stock combinations for testing. If the second level testing is successful the category will be accepted, except for those combinations which did not pass verification testing.

    If the failure rate does not allow acceptance of the category under second level testing all combinations in the category will be verified through testing and the rules above will apply to each combination for that category. If combinations cannot be obtained from customers for verification testings in a category that does not meet the MIL-STD-105 AQL 1.5 requirements, all such combinations will also become a matter for disclosure under 10 CFR Part 21.

11. If no stock combinations are available for verification testing of a particular category the final subcontractor will be reviewed against other categories where this subcontractor was the final subcontractor. If all such categories have been verified to meet the 95% confidence level the category with no stock combinations will be accepted. If the verified categories do not meet the 95% confidence level, or if there are no categories for that final subcontractor which were verified, the category in question will be subject to the rules of second level testing defined above.

OTHER TOPICS

Although not part of the Action Plan, Cardinal has received an answer from ASTM concerning the stress relief question raised by the NRC for SA/A-193 alloy material produced from bars which were cold finished after heat treating. Our letter to the ASTM and their response are attached (Attachments 2 & 3). As can be seen, the ASTM is divided on the issue.

Cardinal has conducted verification testing on all 32 heats of A193 B7 materials with questionable stress relief, that were in stock, and verified that all heats complied with chemical and mechanical requirements. Using MIL-STD-105 we can say that since less than 150 total heats were questionable we have a confidence level of over 96% that all heats are good. Cardinal intends, therefore, to disclose this information to it's customers in a general letter summarizing our progress to date on the Action Plan and will advise all customers that unless notified to the contrary we will not review the stress relief question further.

All current SA/A-193 B7 orders from affected stock alloy materials are being re-heat treated and re-tested in accordance with the specification to insure full compliance prior to use. Current and future orders for this material from overseas subcontractors will require that heat treat, including stress relief be monitored.

Cardinal has satisfactorily completed verification testing on 28 of 42 heats where charpy impact tests were reported to customers for SA/A-193 B7 and SA/A-320 L7 sizes over 1". Under MIL-STD-105 we have a confidence level of 96% that all charpys are good. We will complete a similar program to at least a 95% confidence level for 1) SA/A-194 Grade 6 nuts over 1" that were certified with charpy impact testing and 2) SA/A-194 Grade 7 nuts over 1" from a particular subcontractor who's charpy testing equipment was questionable, if this material was shipped and certified for impact properties. If a 95% confidence level cannot be achieved for either "category" we will test all questionable heats in the

"category" or notify customers of untested heats under 10 CFR Part 21. Once this has been done we will issue a general letter to all customers reporting the final charpy results. We will then regard the charpy issue as closed except for individual customers who may require additional information.

Any tests which may not pass will, of course, become a matter for reporting under 10 CFR Part 21, if such material was certified for impact properties. We have discussed above how this testing is now being controlled by Cardinal to insure full compliance.

If the contents of this report are accepted by the NRC, Cardinal will amend it's Action Plan accordingly. We will also complete the general notification on stress relief and charpy impact testing described above. Upon completion of the Certification Review for ASME size included orders over 1", the Material Verification Program and the Validation survey on washers, Cardinal will issue a final report to the NRC and ask for closure on the three inspections performed to date.

JUNE 20, 1984
REV. AUGUST 7, 1984
REV 2 AUGUST 9, 1984
REV 3 SEPTEMBER 25, 1984
REV 4 JANUARY 4, 1985

ATTACHMENT 1
MATERIALS WHICH WERE IMPROPERLY IMPACT TESTED
A193 & SA193 B7 ALL THREAD STUDS AND BAR

SIZE	AFFECTED HEATS
1 1/8-8:	(4) 4525B, (1) 6882D, (1) 9121E, X107E, X605D, X606D & 8827D
1 1/4-8:	(1,3) 5450B, 5408B, 3454A, 7536B, (1) 9723E, 1508E, (1,4) 8724B & (1) 9476B
1 3/8-8:	(1) 3454A, 5408B, 5450B, 6409B, (1,4) 5785D, 7212E, (1) 9723D
	(1) 9423E, (1) 9814D, (1) 9476B & (1) N011D
1 1/2-8:	(1) N589B, 9525B, 7157D, (1) 9106D & 8724B
1 5/8-8:	(1,4) 9233E, 9423E & (1) 9106D
1 3/4-8:	(4) 9425E & (1) X380E (2 PO'S)
1 7/8-8:	(1) 9892D, (1) 9526B, (1) 7238D, (1,4) 7762E & (1) 8724B
2-8:	(4) 9526B, (1) 9476B
2 1/4-8:	(1,4) D552B & (2) 7315A
2 1/2-8:	(2) 7315A, (2) N825D & (2) N630B

NOTES:

1 -- Tested at 0 Deg F per NX2300 with Charpy V-notch. Heat passed.

2 - Tested at 10 Deg F per NX2300 with Charpy V-notch. Heat passed.

3 -- Tested at 20 Deg F per NX2300 with Charpy V-notch. Heat passed.

4 - Tested at 68 Deg F per NX2300 with Charpy V-notch. Heat passed.

Rockwell International

Committee Correspondence

COMMITTEE: ASTM A01.22

SUBJECT: Letter Ballot 84C Item
84B8 -- Interpretation Questions
for Cardinal Industrial Products

REPLY TO: W.C. Banks
Rockwell International
400 N. Lexington Ave.
Pittsburgh, PA 15208

DATE: December 19, 1984

cc: L.P. Burgess

John J. Simko, Chief Engineer
Cardinal Industrial Products Corporation
3873 West Oquendo
Las Vegas, NV 89118

Dear John:

In reference to my letter to you of November 20, 1984, and our subsequent telephone conversations, I want to give you a corrected tally of the voting on Mr. Donovan's questions in the 84C ballot of our Subcommittee. Mr. Rau's secretary posted some of the comments as negatives and did not list all the abstainers. At any rate, the official final tally is as follows:

Question	Affirmative	Negative	Abstaining	Total Return
#1	15	9	66	90
#2	13	4	73	90
#3	11	8	71	90

As I mentioned in my November 20 letter, I was curious as to why 13 members voted yes on Question #2 concerning the need for a recall. I contacted two of them (R.M. Bruscato-CBI Industries and Al Zeuthen-Long Island Lighting). They did not have specific technical reasons -- just that the practice was not in conformance with the A193 spec and the deviation could set an undesirable precedent. If you want to discuss the issue with the 11 other voters, Mr. Rau can supply you with their names and addresses.

This effort is about as far as our Subcommittee can go in your behalf. You will probably want to call in appropriate consultants to help support you in case of customer complaints about the previously supplied B7 bolting.

My best wishes for a happy holiday season to you and your family. It is unfortunate that our paths did not cross in Williamsburg last month.

Sincerely,

W. C. Banks

W.C. Banks, Chairman
S/C A01.22

WCB:ks

Attachment 3

Cardinal
INDUSTRIAL PRODUCTS CORPORATION

(TOLL FREE) 800-634-6861
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LAS VEGAS, NEVADA 89118

September 10, 1984

Mr. W.C. Banks, Chairman
ASTM A01.22 Subcommittee
Rockwell International
400 N. Lexington Ave.
Pittsburgh, PA 15208

Dear Bill,

This letter will follow up on our recent conversations and correspondence regarding the interpretation from the ASTM A01.22 Subcommittee on Steel on the minimum stress relief temperature for A193 B7. As you know our situation is one where Cardinal Industrial has been using hot rolled bar from the mill which has a chemical composition complying with the specification. The bars are then quenched and tempered in accordance with specification requirements. This operation is followed by cold drawing after which the parts are stress relieved. The mechanical testing is performed on the completed product in the quenched, tempered, and stress relieved condition.

Our typical processing for A193 B7 bar is to austenitize at 1560 deg. F., temper at 1150 deg. F and stress relieve at 1040 deg. F. Since most of Cardinal's products are sold and shipped with material test reports, we have received numerous inquiries from customers and other parties asking whether we are complying with the requirements of the A193 B7 specification. As many customers order under earlier years of the spec, our questions concerning adequacy of stress relieving would cover all years of A193 B7 from 1973 to the current year.

From a background point of view, I understand the language concerning stress relieving temperatures was added in 1973 and refined in later years as a guide for manufacturers to use in processing the material to ensure that the required mechanical properties of the specification are met upon final processing and testing, thereby avoiding costly rejections. The specification stress relief temperature was first referenced in 1973 and refined in 1977, 1980c, 1981a and 1983a.

Using Cardinal's heat treating procedure of quenching, tempering at 1150 deg. F, cold drawing and then stress relieving at 1040 deg. F, we have achieved good consistency in meeting the mechanical properties required by the A193 B7 specification. Our dilemma is one of using a procedure which may not technically comply with the specification but does accomplish the desired result of achieving the mechanical properties. This process has been consistently used for a number of years and Cardinal has shipped large quantities of this material. We therefore feel a sense of urgency in determining whether our process represents a safety hazard requiring either customer notification or possible recall.

We understand that you have a procedure whereby the committee can be balloted on questions requiring immediate answers. Given the numerous recent inquiries which we have received on this issue, we want to answer it as quickly as possible so that Cardinal's customers may be properly apprised of the situation. We would therefore ask that you ballot the committee with the following specific questions:

1. If the intent of the A193 B7 specification which prescribes stress relieving temperatures was to recommend a practice to be used by the manufacturer in order to avoid rejects is it acceptable to use an alternate practice where the material is tempered at 1150 deg. F, cold drawn, stress relieved at 1040 deg. F and tested for the mechanical properties of the spec if this process yields the proper mechanical results?

2. If the answer to 1 above is negative, would this process, assuming good mechanical properties are achieved, represent represent a substantial safety hazard requiring recall?

3. If the answers to 1 and 2 above are negative, could the language used from Table 2 of A193-73 grade B7 "minimum tempering or stress relieving temperature" be interpreted to imply that if either stress relieving or tempering is performed at the prescribed temperature, the other operation need not be at that minimum temperature? Again our situation was one of tempering at 1150 deg. F and stress relieving at 1040 deg. F.

We appreciate your help and that of the committee in answering the above questions. Even though Cardinal is a small company with large exposure on this issue, we will notify and/or recall if it is determined that a safety hazard exists even though this would be financially devastating. If you have any questions, individually, or from the committee members, please call at your earliest convenience. We would appreciate receiving the committe's answers with any related comments in writing.

Sincerely,

M. J. Donovan

M. J. Donovan
Chairman

Suppl. E

Cardinal
INDUSTRIAL PRODUCTS CORPORATION

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LAS VEGAS, NEVADA 89118

February 22, 1985

REPORT TO CUSTOMERS, CONTRACTORS AND OPERATORS #4

It is with a significant feeling of accomplishment that we issue this report as part of our continuing program to advise our customers and other interested parties in the Nuclear Industry of our progress since our last report. Although the process has been difficult and time consuming, it has been of great value to our Company. As a result of improvements to our Quality Assurance System, Cardinal is in a unique position to exercise a leadership role in the Nuclear Fastener Industry.

As background, the NRC conducted a series of three inspections at Cardinal starting in October 1983. The focus of these inspections was Cardinal's previous non ASME approved Quality Assurance System. However, many of the improvements made as a result of our responsiveness to the findings have supplemented and enhanced our ASME approved program. To date, we have satisfactorily addressed all the issues raised by the NRC during their inspections. A significant factor in the NRC's acceptance of Cardinal's responses, was our adoption of an Action Plan which was primarily designed to determine any conditions on installed product that may have been adverse to safety and require notice under 10 CFR Part 21. This Action Plan was forwarded to you as part of our third report that included a copy of the NRC's letter dated August 10, 1984. Subsequent to that date we also received an October 16, 1984 letter (copy attached) accepting our responses and Action Plan as being responsive to their third inspection.

Our Action Plan consisted of three phases: A. Subcontractor Validation, B. Agency Formalization and C. Certification Review.

A. Subcontractor Validation: We are pleased to report this phase is substantially complete. The validations disclosed some procedural deviations in the processing of certain materials by our subcontractors. However, no conditions which cause us to have concern about the compliance of our materials with the chemical and mechanical requirements of applicable specifications was found.

B. Agency Formalization: This phase is substantially completed with full compliance.

C. Certification Review: This is the major remaining open item in Cardinal's Action Plan. Even though we are allocating approximately 25% of our total man hours to Quality Assurance, we have determined that the full certification review, as originally adopted in Cardinal's Action Plan, would take nearly five years to complete. Because of the favorable experience to date, in certification review and related material testing, we suggested amendments in our Action Plan and formally submitted them to the NRC with our recent Interim Report #1.

Attached is the "Amendment to Cardinal's Action Plan". The prime focus of the amendment is to be more responsive in timing of our review by concentrating on ASME size included items over 1" in diameter. We will perform product verification in lieu of certification review for all other items. To date we have conducted more than 360 tests of Cardinal's products and have found NO (ZERO) DEVIATIONS from requirements of the applicable material specifications. Therefore, we are confident that Cardinal's materials have been safe and are in compliance with the chemical and mechanical requirements of the applicable material specifications.

Please refer, under the Other Topics section of the attached Amendment, to the discussion of stress relief and charpy impact testing. Relating to stress relief, we have tested 32 heats of A/SA193 B7 material and all complied with chemical and mechanical requirements. There were less than 150 total heats with questionable stress relief and since the ASTM was divided as to it's opinion on the issue, we will make general customer notifications and, after acceptance, regard the issue as closed. Relating to charpy impact testing, that may have been improperly run, to date 40 of the 50 questionable heats of A/SA193 B7 and A/SA320 L7 have been tested and all met applicable charpy impact requirements. Please refer to the updated Attachment #1 that shows those heats having been re-tested and accepted. Cardinal will regard the charpy issue as complete with the testing conducted to date. If individual customers request, Cardinal will preform additional tests. A Similar testing program is now underway for a limited number of A/SA194 Grade 6 and Grade 7 nuts (over 1"), where the charpy testing equipment was questionable. When this testing is sufficient to assure a 95% confidence level, results will be forwarded to you.

The amendment to our Action Plan has been accepted by the NRC as confirmed by their letter (copy attached) dated February 11, 1985. We are submitting this amendment to our Action Plan for your review and acceptance. If we have not heard from you to the contrary, by March 31, 1985, we will consider that you have accepted the amended Action Plan.

As a result of the NRC inspections and related scrutiny, we feel Cardinal's Quality Assurance Program is the best in the industry. We believe many of the problems that were found at Cardinal, and have since been corrected, are still existing throughout most of the Nuclear Fastener Industry. You can now be assured that Cardinal is one company which has addressed these issues. We have been audited by many customers in recent months and are gratified most have continued their relationship with Cardinal. We are committed to the Nuclear Industry and Cardinal will be in a leadership role in the Nuclear Fastener Industry of the future.

During this entire process Cardinal has observed that many customers are experiencing problems with requisitioning and/or procurement of nuclear fasteners. Consequently we have developed a new concept, "A Comprehensive Approach to Requisitioning and Procurement of Nuclear Fasteners and Bar Products." Our concept is: (1) it is more economical and efficient to work with one Quality System to the highest practicable standards; (2) the existence of pre-planned technical and quality requirements are essential. With these underpinnings individual requisitions can be quickly and efficiently processed in a manner that will preclude the possibility of error. We see the Nuclear Fastener Industry of tomorrow as being one that is characterized by a few manufacturers with more limited product offerings and many customers. In the replacement/maintenance environment where there are many small orders for specific parts, we believe our concept is a practical approach to solving this most complex problem. We encourage you to contact us at your earliest convenience for addtional information. At that time we can explore our concept with you and determine if it would suit the needs of your facility.

Sincerely,

Dennis C. Fielder

Dennis C. Fielder
President

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

October 16, 1984

RECEIVED

OCT 1 5 1984

DENNIS C. FIELDER

Docket No. 99900840/84-01

Cardinal Industrial Products Corporation
ATTN: Mr. Dennis Fielder, President
3873 West Oquenda
Las Vegas, Nevada 89118

Gentlemen:

Thank you for your letters of September 27, 1984, and October 1, 1984, in response to our letter dated August 29, 1984. We have reviewed your reply and find it responsive to the concerns raised in our Notice of Violation and Nonconformance. We will review the implementation of your corrective actions during a future inspection to determine that full compliance has been achieved and will be maintained.

Sincerely,

Gary G. Zech, Chief
Vendor Program Branch
Division of Quality Assurance,
Safeguards and Inspection Programs
Office of Inspection and Enforcement

8410180307 1p

AMENDMENT TO CARDINAL'S ACTION PLAN *

A) CERTIFICATION REVIEW

Cardinal has currently Performed over 360 verification tests on over 130 heats of material. All of these tests were good, indicating that there have been no defective materials provided by Cardinal to the nuclear industry. The detailed review will, however, continue for all ASME Section III size included materials. Even though Subsection NF allows size exclusion through 2" diameter for bolting, Cardinal will review all orders and certifications for ASME Section III bolting and bar materials over 1" diameter. The same review and acceptance criteria, from the Action Plan, will continue for these size included items. This review will highlight any and all problems with certifications on ASME size included orders including traceability, vendor approval, inspection, chemical and mechanical testing, charpy impact testing (only required by NX2311 for sizes over 1") and nondestructive examination including magnetic particle, liquid penetrant and ultrasonic (only required by NX2580 for sizes over 1"). We will also determine if a sufficient number of tests and of the right type were conducted. Any deviations resulting from this review will become a matter for possible re-testing and amending certifications and/or issuing notice under 10 CFR Part 21.

B) MATERIAL VERIFICATION

Cardinal will immediately start a material verification program of overseas subcontractors who's Quality Assurance Programs had deficiencies. Excluded from this verification program will be the raw material producers/mills and other overseas subcontractors who's programs were properly validated. The steps in the material verification are as follows:

1. All procurement document files will be pulled for the overseas subcontractors who's material is to be verified.

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* Excerpted verbatim, except for page numbers, from NRC accepted Interim Report #1. Copies of the full report are available upon request.

2. The procurement documents will be sorted by final subcontractor and product type to make a "category". "Final subcontractors" are defined as the last subcontractor before Cardinal's agent in the "channel".
3. Each category will be sorted by heat and diameter. Each unique heat and diameter will be called a "combination".
4. Cardinal's Quality Assurance Department will review each category and/or combination to determine if they have been, or may be used on nuclear orders.
5. Each category from 4 above will be reviewed against MIL-STD-105 AQL 1.5 to determine the number of combinations which must be verified by testing to insure a 95% confidence level. We will use a single sampling plan for Normal Inspections, General Inspection Level II.
6. The combinations to be tested will be selected on the following basis:
   a-Top priority to combinations which are in stock.
   b-Second priority on those materials which should be easiest to recall from the field for testing.
   c-Lowest priority on materials in the field which can not be easily recalled for testing.
7. The number of combinations for each category to be verified from 6 above, will be tested in accordance with the lastest year of the specification indicated below. * One piece per combination will be tested:
   a) Mechanical testing-All mechanical properties of the material specification will be verified with the exception of charpy impact tests (discussed more fully below). Unsual mechanical tests, such as stress rupture for SA453 Grade 660 material, will only be verified if such test results were certified by Cardinal on a nuclear order, and Cardinal based it's certification upon test results submitted by a subcontract vendor who's quality system was questionable.
   b) Chemical testing-The chemical properties of the material specification will be verified for all alloy, stainless and non-ferrous materials by product analysis. Carbon steels will not be verified because chemistry should have no affect on the intended use of the product.
8. If any of the testing from 7 above fails to meet specification requirements, two re-tests of the failed attribute/s will be made. If both re-tests are good the initial test will be disregarded. If either or both of the re-tests fail, the material will be deemed to be in non compliance with the material specification and will be a matter for notice under 10 CFR Part 21.

9. If the product verifiction of the combinations meets the requirements of MIL-STD-105 AQL 1.5, the category will be accepted with no further testing or review.

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* Sentence added 2/21/85.

If the failure rate does not allow acceptance of the category, all combinations in the category will be verified through testing applying the above criteria. If combinations cannot be obtained from customers for verification testing in a category that does not meet MIL-STD 105 AQL 1.5 requirements, all such combinations will become a matter for disclosure under 10 CFR Part 21.

OTHER TOPICS

Although not part of the Action Plan, Cardinal has received an answer from ASTM concerning the stress relief question raised by the NRC for SA/A-193 alloy material produced from bars which were cold finished after heat treating. Our letter to the ASTM and their response are attached (Attachments 2 & 3). As can be seen, the ASTM is divided on the issue.

Cardinal has conducted verification testing on all 32 heats of A193 B7 materials with questionable stress relief, that were in stock, and verified that all heats complied with chemical and mechanical requirements. All of the 32 heats tested came from the same homogenious lot of approximately 150 total heats with questionable stress relief. By using MIL-STD-105 we have a confidence level of over 96% that all heats are good. Cardinal intends, therefore, to disclose this information to it's customers in a general letter summarizing our progress to date on the Action Plan and will advise all customers that unless notified to the contrary we will not review the stress relief question further.

All current SA/A-193 B7 orders from affected stock alloy materials are being re-heat treated and re-tested in accordance with the specification to insure full compliance prior to use. Current and future orders for this material from overseas subcontractors will require that heat treat, including stress relief be monitored.

Cardinal has satisfactorily completed verification testing on 34 of 49 heats where charpy impact tests were reported to customers for SA/A-193 B7 and SA/A-320 L7 sizes over 1". Since all heats of material came from the same homogenious lot we can use MIL-STD-105 to establish a confidence level of over 96% that all charpys are good. We will complete a similar program to at least a 95% confidence level for 1) SA/A-194 Grade 6 nuts over 1" that were certified with charpy impact testing and 2) SA/A-194 Grade 7 nuts over 1" from a particular subcontractor who's charpy testing equipment was questionable, if this material was shipped and certified for impact properties. If a 95% confidence level cannot be achieved for either "category" we will test all questionable heats in the "category" or notify customers of untested heats under 10 CFR Part 21. Once this has been done we will issue a general letter to all customers reporting the final charpy results. We will then regard the charpy issue as closed except for individual customers who may require additional information.

Any tests which may not pass will, of course, become a matter for reporting under 10 CFR Part 21, if such material was certified for impact properties. We have discussed above how this testing is now being controlled by Cardinal to insure full compliance.

If the contents of this report are accepted by the NRC, Cardinal will amend it's Action Plan accordingly. We will also complete the general notification on stress relief and charpy impact testing described above. Upon completion of the Certification Review for ASME size included orders over 1", the Material Verification Program and the Validation survey on washers, Cardinal will issue a final report to the NRC and ask for closure on the three inspections performed to date.

Attachment 3

Cardinal
INDUSTRIAL PRODUCTS CORPORATION

(TOLL FREE) 800-634-6861
3873 WEST COUENDO + PHONE (NEVADA) 702-739-1998
LAS VEGAS, NEVADA 89118

September 10, 1984

Mr. W.C. Banks, Chairman
ASTM A01.22 Subcommittee
Rockwell International
400 N. Lexington Ave.
Pittsburgh, PA 15208

Dear Bill,

This letter will follow up on our recent conversations and correspondence regarding the interpretation from the ASTM A01.22 Subcommittee on Steel on the minimum stress relief temperature for A193 B7. As you know our situation is one where Cardinal Industrial has been using hot rolled bar from the mill which has a chemical composition complying with the specification. The bars are then quenched and tempered in accordance with specification requirements. This operation is followed by cold drawing after which the parts are stress relieved. The mechanical testing is performed on the completed product in the quenched, tempered, and stress relieved condition.

Our typical processing for A193 B7 bar is to austenitize at 1560 deg. F., temper at 1150 deg. F and stress relieve at 1040 deg. F. Since most of Cardinal's products are sold and shipped with material test reports, we have received numerous inquiries from customers and other parties asking whether we are complying with the requirements of the A193 B7 specification. As many customers order under earlier years of the spec, our questions concerning adequacy of stress relieving would cover all years of A193 B7 from 1973 to the current year.

From a background point of view, I understand the language concerning stress relieving temperatures was added in 1973 and refined in later years as a guide for manufacturers to use in processing the material to ensure that the required mechanical properties of the specification are met upon final processing and testing, thereby avoiding costly rejections. The specification stress relief temperature was first referenced in 1973 and refined in 1977, 1980c, 1981a and 1983a.

Using Cardinal's heat treating procedure of quenching, tempering at 1150 deg. F, cold drawing and then stress relieving at 1040 deg. F, we have achieved good consistency in meeting the mechanical properties required by the A193 B7 specification. Our dilemma is one of using a procedure which may not technically comply with the specification but does accomplish the desired result of achieving the mechanical properties. This process has been consistently used for a number of years and Cardinal has shipped large quantities of this material. We therefore feel a sense of urgency in determining whether our process represents a safety hazard requiring either customer notification or possible recall.

We understand that you have a procedure whereby the committee can be balloted on questions requiring immediate answers. Given the numerous recent inquiries which we have received on this issue, we want to answer it as quickly as possible so that Cardinal's customers may be properly apprised of the situation. We would therefore ask that you ballot the committee with the following specific questions:

1. If the intent of the A193 B7 specification which prescribes stress relieving temperatures was to recommend a practice to be used by the manufacturer in order to avoid rejects is it acceptable to use an alternate practice where the material is tempered at 1150 deg. F, cold drawn, stress relieved at 1040 deg. F and tested for the mechanical properties of the spec if this process yields the proper mechanical results?

2. If the answer to 1 above is negative, would this process, assuming good mechanical properties are achieved, represent represent a substantial safety hazard requiring recall?

3. If the answers to 1 and 2 above are negative, could the language used from Table 2 of A193-73 grade B7 "minimum tempering or stress relieving temperature" be interpreted to imply that if either stress relieving or tempering is performed at the prescribed temperature, the other operation need not be at that minimum temperature? Again our situation was one of tempering at 1150 deg. F and stress relieving at 1040 deg. F.

We appreciate your help and that of the committee in answering the above questions. Even though Cardinal is a small company with large exposure on this issue, we will notify and/or recall if it is determined that a safety hazard exists even though this would be financially devastating. If you have any questions, individually, or from the committee members, please call at your earliest convenience. We would appreciate receiving the committe's answers with any related comments in writing.

Sincerely,

M. J. Donovan

M. J. Donovan
Chairman

JUNE 20, 1984
REV. AUGUST 7, 1984
REV 2 AUGUST 9, 1984
REV 3 SEPTEMBER 25, 1984
REV 4 JANUARY 4, 1985
REV 5 JANUARY 31, 1985
REV 6 FEBRUARY 21, 1985

ATTACHMENT 1
MATERIALS WHICH WERE IMPROPERLY IMPACT TESTED
A193 & SA193 B7 ALL THREAD STUDS AND BAR
(ALL RETESTS AT TEMPERATURES INDICATED BELOW WERE GOOD)

SIZE	AFFECTED HEATS
1 1/8-8:	(4) 4525B, (1) 6882D, (1) 9121E, (1) X107E, (1) X605D, (1) X606D & (1) 8827D
1 1/4-8:	(1,3) 5450B, 5408B, 3454A, 7536B, (1) 9723E, (1) 1508E, (1,4) 8724B
	(1) 9476B, (1) N047D & (1) 9723D
1 3/8-8:	(1) 3454A, 5408B, 5450B, (1) 6409B, (1) 5785D, (1,4) 7212E, (1) 9723D
	(1) 9423E, (1) 9814D, (1) 9476B & (1) N011D
1 1/2-8:	(1) N589B, (1) 9525B, (1) 7157D, (1) 9106D & (1) 8724B
1 5/8-8:	(4) 9233E, (1) 9423E & (1) 9106D
1 3/4-8:	(1,4) 9425E & (1) X380E (2 PO'S)
1 7/8-8:	(1) 9892D, (1) 9526B, (1) 7238D, (1) 7762E & (1,4) 8724B
2-8:	(1,4) 9526B & (1) 9476B
2 1/4-8:	(1,4) D552B & (2) 7315A
2 1/2-8:	(2,4) 7315A, (2) N825D & (2) N630B

NOTES:

1 - Tested at 0 Deg F per NX2300 with Charpy V-notch. Heat passed.

2 - Tested at 10 Deg F per NX2300 with Charpy V-notch. Heat passed.

3 - Tested at 20 Deg F per NX2300 with Charpy V-notch. Heat passed.

4 - Tested at 68 Deg F per NX2300 with Charpy V-notch. Heat passed.

Cardinal
INDUSTRIAL PRODUCTS CORPORATION

(TOLL FREE) 800-634-6861
3873 WEST OQUENDO ✦ PHONE (NEVADA) 702-736-1966
LAS VEGAS, NEVADA 89118

AUGUST 8, 1984

Cary Q. Zech, Chief
Vendor Program Branch
Division of Quality Assurance, Safeguards,
and Inspection Programs
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Docket No. 99900840

Dear Mr. Zech:

We have received and reviewed your letter of July 23, 1984. In response to your request for additional information with respect to the following items in the Notice of Nonconformance (NON):

General - We will furnish results of our review as soon as they are available. At this time we are attaching a copy of our Action Plan which details the three major stages of the corrective action plan now in progress.

NON, Item B.2 - We have performed another audit for analytical services and found them to be acceptable during the time we used them. We are not using them at this time.

NON, Item B.4 - Retests are being performed using the Charpy V-Notch method, so far all heats tested have passed. See attachment dated August 7, 1984 for current status. As part of the Action Plan we will review all impact tests for nuclear orders. Where appropriate, CMTRs will be ammended to indicate actual Charpy Values. All current and future impact tests will be to the applicable specification and be certified accordingly.

NON, Item C.1 - The standard practice was distributed and reviewed after issue on January 9, 1984. We will conduct an additional training session for Purchasing and Quality Assurance by September 1, 1984 which will be formally documented.

NON, Item E.2 - Atttached is a copy of our request. Response has not been received. A follow up call was placed to expedite.

NON, Item E.3 - Corrective measures have been taken as part of Quality Assurance Review per CSP 3.004, which provides for review by Quality Assurance of customer purchase order to assure that material, subcontractor certifications, and Cardinal's CMTRs are consistent with the customer purchase order.

NON, Item E.6 - Actual data confirming multiple test per specification will be obtained from subcontractors or tests will be performed. Refer to the attached Action Plan for more on multiple testing.

NON, Item F.1 - Corrective measures have been taken as part of Quality Assurance Review per CSP 3.004. This review assures that customer purchase order and starting material are compatable before start of production.

NON, Item F.5 - Under CSP 16.003 when NDE is performed the report is reviewed and approved by Quality Assurance and any material not passing NDE is non conformanced, placed in the QA hold area and dispositioned by the chief inspector. The NDE report is attached to all ASME CMTRs and forwarded to the customer.

NON, Item I. - The Senior Vice President of Quality Assurance is currently visiting subcontractors making the final arrangements to fully implement monitoring. All Cardinal purchase orders contain a right of access clause which permits us to implement monitoring.

Sincerely,

Dennis C. Fielder

Dennis C. Fielder
President

cc Ellis W. Merschoff

JUNE 20, 1984
REV. AUGUST 7, 1984
REV 2 AUGUST 9, 1984

ATTACHMENT 1
MATERIALS WHICH WERE IZOD TESTED
A193 & SA193 B7 ALL THREAD STUDS

SIZE	AFFECTED HEATS
1 1/8-8:	(4) 4525B , (1) 6882D , (1) 9121E , (5) X107E, X605D & X606D
1 1/4-8:	(1,3) 5450B, 5408B, 3454A, 7536B , (1) 9723D , (1,4) 1508E & 8724B
1 3/8-8:	(4) 3454A, 5408B, 5450B, 6409B, 5785D, 7212E , (1) 9723D
1 1/2-8:	(1) 9423E & (1) 9814D (1) N589B, 9525B, 7157D, 9106D & 8724B
1 5/8-8:	(1,4) 9233E, 9423E , (1) 9106D
1 3/4-8:	(4) 9425E & (1) 380E (2 PO'S)
1 7/8-8:	(1) 9892D , (1) 9526B , (1) 7238D , (1,4) 7762E , (1) 8724B
2-8:	(4) 9526B
2 1/4-8:	(1,4) D552B & (2) 7315A
2 1/2-8:	(2) 7315A , (2) N825D & (2) N630B

NOTES:

1 - Tested at 0 Deg F per NX2300 with Charpy V-notch. Heat passed.

2 - Tested at 10 Deg F per NX2300 with Charpy V-notch. Heat passed.

3 - Tested at 20 Deg F per NX2300 with Charpy V-notch. Heat passed.

4 - Tested at 68 Deg F per NX2300 with Charpy V-notch. Heat Passed.

5 - Material being tested at 0 Deg F per NX2300 with Charpy V-notch.

Cardinal
INDUSTRIAL PRODUCTS CORPORATION

3873 WEST DOUENDO + PHONE (NEVADA) 702-739-1968 (TOLL FREE) 800-634-6881
LAS VEGAS, NEVADA 89118

June 5, 1984

ASTM
1916 Race Street
Philadelphia, PA 19103

Attention : Mr. Earl Sullivan

Dear Mr. Sullivan,

We have a situation where our material, AISI 4140, is tempered at 1150°F and stress relieved at 1040°F. This is our normal practice for ASTM Spec A193-B7 requirements of the current spec, but in some instances the requirements of A193 of 1971 or 1974 must be met.

Recent unofficial opinions by Bill Banks and Albert Zuethen, as to the current issue of A193-B7 have been stated as follows:

"The minimum Tempering Temperature shall be as specified in Table 2." (shown as 1100°F, not actual temperature.)

"The minimum Stress Relief Temperature shall be 100°F below the specified minimum Tempering Temperature of Table 2."

At present we are in need of a verification of these opinions or an official, written interpretation of Minimum Tempering Temperature and Minimum Stress Relief Temperature, and we ask for your help in this matter.

Please send reply to writer at the above address, and accept our grateful thanks for this special favor.

Sincerely Yours,

John J. Simko

John J. Simko,
Chief Engineer

cc- Mr. Bill Banks

JJS/krc

AUGUST 8, 1984
CSP 8.003

CARDINAL INDUSTRIAL PRODUCTS CORP.
STANDARD PRACTICE

This Standard Practice will apply to procurement which invokes Cardinal's Quality Assurance Program and either 10 CFR 50 Appendix B or N45.2 but does not invoke Section III, of the ASME Boiler and Pressure Vessle Code.

A. PURCHASING
Parts and/or materials may be purchased from surveyed and approved vendors as prescribed in the Quality Assurance Manual. As an alternate, vendors may be qualified thru other means such as evaluation of Quality program or product verification as outlined in "D" below at time of receiving inspection.

B. INSPECTION
Per Quality Assurance Manual.

C. CERTIFICATIONS
Vendor Certification: Vendor certifications will not require a Quality Statement but must consist of a Mill Sheet, Certified Material Test Report (CMTR) or a Certificate of Compliance (C of C). In the case of a C of C, heat numbers need not be known if product verification as delineated below is followed.

Cardinal Certification: The Cardinal Certification for material provided under this standar practice shall bear the statement that the certification is issued subject to the provisions of this supplement as approved by the customer. Other data required by the purchase order will be given in the certification except Cardinal will not provide its QSC number.

D. PRODUCT VERIFICATION
Raw Material: For carbon steel raw material, Cardinal will determine that the material is ferro-maynetic and that the hardness range is as expected for the grade of carbon steel. For all other raw materials, Cardinal will additionally verify the chemical content of one piece of material and required mechanical testing and record such verification in the vendor certification file.
Finished Product: If carbon steel finished products are procured, Cardinal will verify that the material is ferro-magnetic and that the product meets the hardness and mechanical properties of the invoked material spec-

ification. The number of pieces tested will be as required by the referenced finished product specification. In the case of procurement for all other types of finished materials, Cardinal will additionally perform a verification of chemistry on one piece of material This data will be included in the vendor certification file.

E. MARKING
All finished products will be marked in accordance with applicable customer and specification requirements. In cases where Cardinal procures finished products which are properly marked, no additional marking will be applied. If product requires additional marking this will be applied by Cardinal prior to shipment.

Customer Name _____

Location _____

Projets Applicable To _____

Approved By _____

Date Approved _____