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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

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PROCUREMENT AND SYSTEMS
ACQUISITION DIVISION

June 11, 1979

B-193530

The Honorable Richard S. Schweiker
United States Senate

Dear Senator Schweiker:

This is in reply to your December 19, 1978, request on behalf of Dr. Lewis B. Udis, President of Alan Scott Industries, Philadelphia, Pennsylvania. You asked us to review a voluminous series of documents concerning two unsolicited value engineering change proposals (VECPs) submitted by Dr. Udis to the Defense Personnel Support Center (DPSC), a field activity of the Defense Logistics Agency.

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The issues raised by Dr. Udis are not new; they are essentially the same complaints as those he brought to your attention earlier in 1978 and to other members of the Congress in 1976 and 1977. Because of your interest and in view of the tenacity and persistence of Dr. Udis, we reexamined the documents, interviewed Dr. Udis and DPSC personnel, examined DPSC records, contacted experts in metallurgy, reviewed a Defense Logistics Agency Inspector General's report on these same matters, and obtained the views of other industry sources.

Our January 19, 1978, letter to you expressed our opinion that the Department of Defense had neither mistreated Dr. Udis nor acted improperly in dealing with his VECPs and further review by us would serve no useful purpose. Our reexamination of these issues leads us to the same conclusion. This letter summarizes the issues and briefly outlines the facts and circumstances of the dispute between Dr. Udis and DPSC.

Dr. Udis made two unsolicited VECPs concerning (1) the lot sample size for heat treat and hardness testing and (2) the use of copper sulfate and boil tests for corrosion resistance. Both VECPs were directed to DPSC's specifications for purchasing dental and surgical instruments. At that time, Alan Scott Industries was a potential supplier of these instruments.

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LOT SAMPLE SIZE FOR HEAT
TREAT AND HARDNESS TESTING

In a letter dated April 28, 1976, Dr. Udis formally applied for value engineering participation in any savings that might result from his suggestion that paragraph 4.2.2.1 of Purchase Description Number 11 be eliminated. He cited the then existing Armed Services Procurement Regulation (now Defense Acquisition Regulation) paragraph 1-1708 for unsolicited VECPs. That particular paragraph has since been deleted by Defense Procurement Circular 76-9, dated August 30, 1977.

At that time, paragraph 1-1708 (1976 ed.) provided for consideration of an unsolicited VECP for a supply or service for which the proposer company did not have a current contract. Under the regulation, such proposals must have provided for reduction of costs without impairing essential functions or characteristics of the supply or service. Although the Government could purchase an unsolicited VECP, the contract price could not exceed 20 percent of the savings. The paragraph in the Defense Medical Purchase Description Number 11, dated November 1972, that Dr. Udis suggested eliminating states:

> "4.2.2.1 Lots for hardness criteria. For finished forceps hardness testing, a lot or batch shall consist of forceps produced by one manufacturer, at one plant, from the same material (same raw material heat and heat treatment) and from the same heat treatment lot or batch (forceps undergoing heat treatment at the same time, in the same tray, rack or other containing device)."

Dr. Udis asserts this paragraph is restrictive and will not allow the use of a continuous, automated belt-type furnace in heattreating instruments. He suggested that instruments be subjected to heat treatment simultaneously in a continuous, fully automated, conveyor belt-type furnace. He provided arithmetical computations that purported to show a net savings of $1.68 for each instrument.

In a letter dated July 19, 1976, DPSC advised Dr. Udis that his proposal had "* * * been evaluated and favorably considered with regard to the modification of requirements specifying sampling for hardness for forged dental instruments." It is important to note that, as a result of the favorable consideration, requirements were modified only as to the number of instruments in the sample to be tested. DPSC clearly stated that specifications for instruments, both surgical and dental, have never included specific production methods or

techniques regarding heat treatment. Since no specific methods were required, a continous belt-type method was permitted, as was any other acceptable commercial technique. Therefore, savings proposed upon a particular method of heat treating could not be considered. As to the savings that might result from the proposal, DPSC asked Dr. Udis for a detailed cost analysis to substantiate his computed savings.

In his August 16, 1976, letter responding to DPSC's request for additional detailed cost, Dr. Udis presented arithmetical computations suggesting a savings of $2.30 for each instrument. Again Dr. Udis' computations were based upon comparing one method of heat treatment with another, but the specifications do not mandate the use of any particular heat-treat method. Thus, savings based upon a particular method of heat treatment could not be favorably considered.

Dr. Udis' computation of unit savings of $2.30 was based on a quote from the Drever Company that included both heat treat and inspection for the same instrument (FSN 6520-299-9671) that DPSC was purchasing in 1976 for $1.41 a unit. Furthermore, in 1978 Dr. Udis contracted with DPSC to supply that same instrument for $1.78 each. This clearly demonstrates that the savings, even if it could have been substantiated, was unrealistic.

DPSC recognized that the change in the number of items to be tested might result in some savings. DPSC asked 14 suppliers and manufacturers of dental instruments if a savings would result from the revised sampling plan. Eight replied no savings or very small savings would result; five did not know; and one actually said the costs would increase. DPSC attempted to estimate the possible savings and, on the basis of conjecture and certain assumptions, calculated a savings estimate of about $9,000. A 20-percent share would be about $1,800. However, the DPSC Office of Counsel refused to permit an award to Dr. Udis on the grounds that savings must be based on fact and not conjecture or assumption.

Conclusion

In our opinion, it is almost impossible to determine the quantifiable actual savings resulting from the revised specification on lot sample size for heat treat and hardness testing. Too many variables exist in such areas as manufacturing production processes, heat-treat methods, source and quality of raw materials, and lot sizes to make a meaningful comparison. There is insufficient support to justify a share of monetary savings to Dr. Udis. Twenty percent of zero is still zero.

COPPER SULFATE AND BOIL TEST FOR CORROSION RESISTANCE

On September 17, 1976, Dr. Udis formally asked DPSC for value engineering participation in any savings resulting from the elimination of the copper sulfate test and boil test which are used to determine the resistance to corrosion. The two tests are set forth in the Federal general specification for dental and surgical instruments, GG-I-526b, dated October 11, 1965.

Copper sulfate test

In the copper sulfate test, instruments are scrubbed with soap and warm water, rinsed in hot water, dipped in ethyl alcohol, and dried. Whenever possible, the instruments should be completely immersed in the copper sulfate solution. Instruments too large for complete immersion are partially immersed or are tested by drops of the solution. Copper sulfate solution remains in contact for 6 minutes and is then wiped off with a cloth saturated with fresh water. If the copper plating can be wiped off, the instrument passes; if not, it fails.

Boil test

In the boil test, instruments are scrubbed with soap and water, rinsed thoroughly in distilled water, and dried. Then the instruments are boiled in distilled water in a glass beaker for 30 minutes and remain submerged for an additional 24 hours. If all the exposed surfaces that are required to be smooth show no signs of corrosion (rust), the instrument passes. A slight corrosion in serrations, teeth, locks, ratchets, or crevices is not a cause for rejection.

Dr. Udis' position

Dr. Udis believes the copper sulfate test should be eliminated. He references MIL-STD-753A, QQ-P-35B, and the American Society for Testing and Materials Standard A380-72. He states that the copper sulfate test is not recommended for straight chromium, ferritic, and martensitic types of the AISI 400 series stainless steel since the test will show a positive reaction on these materials. (The type of steel used in these instruments is generally 410 and 420 stainless steel.) This test evaluation is inconclusive because it is directly related to the degree of effort applied to wiping off the copper plating. This fact allows for "discretion and adversary interpretation," when the copper sulfate test is performed and evaluated by DPSC's testing laboratory.

Dr. Udis also believes the boil test should be eliminated because the test depends on an interpretation of what constitutes a "slight corrosion in serrations, teeth, locks, ratchets, crevices, etc." This language allows for arbitrary adversary interpretation for rejection of instruments. Practical elimination of corrosion with the type AISI 400 series is impossible. Control by use of corrosion inhibitors is the standard procedure required in autoclave sterilization. According to Dr. Udis, the standard preparation procedure for sterilization is as follows:

1. Clean instruments, place in a basket, and immmerse in rust inhibitor cleaner for 1 hour or longer.

2. Place instruments in basket, immerse in Mueller rust inhibitor, and drip dry 30 minutes or longer.

3. Double wrap in two 4" x 4" gauze.

4. Double wrap in two 17" x 17" rust inhibitor papers.

5. Upon completion of above, place instruments in an autoclave.

DPSC's position

DPSC's position is that tests required by GG-I-526b are valid. Furthermore, because MIL-STD-753A and QQ-P-35B are not listed as applicable specifications, they cannot be considered relevant.

Despite the fact that the specifications were not relevant, DPSC investigated the specifications referenced by Dr. Udis and found that the word "annealed" was omitted from the applicable paragraph in MIL-STD-753A. DPSC asked the authors of MIL-STD-753A the reason for this omission. After reviewing the matter, the authors indicated the copper sulfate test may work with some of the martensitic AISI 400 series stainless steel in the heat-treated condition. This change to MIL-STD-753A was published on April 22, 1977. Since DPSC purchases instruments in the heat-treated, hardened condition, the copper sulfate test would apply. On June 14, 1977, DPSC advised Dr. Udis of these findings.

Because many of the instruments are manufactured in foreign countries, such as England, Pakistan, and West Germany,

the Government cannot perform quality assurance surveys at the manufacturing plant. Quality assurance for dental and surgical instruments cannot be completed without tests for corrosion resistance. The copper sulfate test and the boil test provide a comprehensive picture of the quality of manufacturing practice used in making the instruments. They also provide a measure of assurance of the service life of instruments through steam autoclavings and exposure to body fluids and detergent solutions.

The martensitic stainless steels are heat hardenable and strong, make good cutting edges, and have good corrosion resistance. Despite these attainable properties, instruments not properly made will demonstrate poor corrosion resistance.

The copper sulfate test is an effective index of the quality of passivity of an instrument. Defective instruments reveal an adherent copper plate.

The boil test has proven its value in detection of fine cracks, fissures, and metal separations not easily visible to the unaided eye. Rusting occurs at these areas.

Because these two tests for corrosion resistance reflect upon the quality of chemical composition, heat treatment, stress relief, forging, surface cleanliness, smoothness, and density, knowledgeable manufacturers of quality instruments use the copper sulfate test and the water boil test as a means of internal quality control for commercial as well as military production.

The American Dental Association Specification Number 29 for hand instruments, approved November 1975, requires a copper sulfate test and boil test (paragraphs 4.4.4.1 and 4.4.4.3) which are almost word-for-word the tests set forth in GG-I-526b. In addition, the American Society for Testing and Materials in its latest ANSI/ASTM A380-78, which replaced A380-72, includes a copper sulfate test specifically for use with dental and surgical instruments that is almost identical to GG-I-526b.

Independent third-party position

In an effort to be fair and objective to both Dr. Udis and DPSC, we obtained consultative technical advice on metallurgy from an independent source. We asked the head of the Materials Research Laboratory Section at the National Science Foundation for advice. Our questions and the answers are as follows:

Question: Are the copper sulfate and boil tests valid and reasonable methods to use in testing the quality of stainless steel dental and surgical instruments?

Answer: For the 420 series stainless, the modified copper sulfate test is viewed as preferable to the standard test--see American Dental Association Specification Number 29. The supplier's objection to the relatively subjective nature of the evaluation of the test results can be raised with respect to practically any corrosion test we are familiar with, inasmuch as essentially all of these depend on the evaluation by a skilled person. In general, we would consider both the modified copper sulfate test and the boil test as perfectly reasonable quality control checks, even though neither of these can be viewed as an absolute test. As stated before, we are not aware of any such absolute tests in the area of corrosion. Furthermore, the standard preparation procedure prior to sterilization, as described in your letter, seems to us most unlikely to be readily adhered to in actual practice.

Question: Is it a generally accepted industry practice to test for corrosion resistance relying on human judgment, as in wiping off a solution and determining whether there is a slight amount of corrosion?

Answer: Yes, essentially all of the corrosion resistance tests rely on evaluation by skilled personnel. In many cases the judgment factor is minimized--but not entirely eliminated--by carrying out a large number of tests and then evaluating the data statistically. However, that kind of approach does not seem appropriate for the purpose here.

Question: Have there been advances in the state-of-the-art regarding corrosion testing that would render the copper sulfate test and the boil test invalid or inappropriate for testing today's instruments?

Answer: Not to our knowledge. If the supplier is aware of any tests that are superior to either of the two in contention, then he should present the case for a change and the rationale for the more valid--or more appropriate--nature of the proposed alternative techniques.

General comment: We agree that the tests--in common with other corrosion tests--are not absolute, but that is not synonymous with invalid. In our considered view, an instrument which does pass these tests is less likely to form corrosion products in dental/surgical use than one which does not pass them. Therefore, we do not consider these tests as invalid and unnecessarily restrictive.

Other industry views

In July 1976, DPSC asked other manufacturers and suppliers of dental and surgical instruments if they routinely perform the copper sulfate and boil tests. DPSC received responses from 16 companies. Of these 16 companies, 11 (or 69 percent) routinely perform the boil test; 9 (or 56 percent) routinely perform the copper sulfate test; and 8 (or 50 percent) routinely perform both tests.

We contacted several of the companies that indicated they did not routinely use these tests to ask why. One quality control manager said that while he does not perform both tests routinely, he does use them with reasonable frequency. Another quality engineer told us he did not use the tests because he used a high-quality steel source and never had any quality problems with its steel. These industry sources considered both tests to be fair and realistic for the purpose intended. According to another industry official, if a wet-steam autoclave instead of a dry-steam autoclave is used to sterlize instruments, those made with inferior steel will rust.

A manufacturer of dental instruments that was not included in the DPSC survey did not routinely perform the tests because it relied on the quality of stainless steel from a soure that it had dealt with for years. While this manufacturer did not do any testing, it did indicate the tests are reasonable and relatively inexpensive to perform. Furthermore, on Government sales, the manufacturer performs the tests.

Conclusion

The preponderance of evidence clearly indicates that DPSC did not improperly reject Dr. Udis' VECPs to eliminate the copper sulfate and boil tests. Indeed, DPSC must provide the necessary quality tests to assure that the Government gets what it pays for. Furthermore, the tests cannot be considered restrictive because other manufacturers routinely use these tests.