SIERRA ENGINEERING CO.
Subsidiary of Cap Tech. Inc.

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Safety in Living

March 16, 1970

National Aeronautics and
Space Administration
Manned Spacecraft Center
Houston, Texas 77058

Attention: Mr. Vince Mason/BG721(7)

Subject: NASA Contract NAS 9-8776
Final Report

Gentlemen:

Sierra Engineering Co. entered into a Contract (NAS 9-8776) on August 20, 1968, to supply NASA with 42 each Emergency Oxygen Mask Assemblies (EOMA). These masks were to be basically the same as had been supplied by Sierra Engineering Co. under the earlier Contract NAS 9-7513, which drawings, specification, and control documents were developed by Sierra. Delivery of the masks and supporting documents was completed in 1969. These mask assemblies have been accepted by NASA.

Sierra's policy of delivering a product most suitable for its intended use was accomplished by closely coordinating with the assigned Technical Monitors, Contract Negotiators, and Quality Control Representatives. Following this policy, exceeding the requirements of the contract at times, resulted in a design and quality worthy of inclusion as flight hardware in the Apollo Missions.

Most of the Sierra Engineering Co. Documents, per NAS-7513, required no significant changes. Changes for the most part were updated to reflect applicability to this contract.

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The Oxygen Supply Hose was changed to provide solid Flourel construction. This construction replaced the combination of silicone and Flourel used in the previous contract. This change improved the fire resistance of the hose. Since the Flourel is more difficult to mold, new techniques had to be developed to obtain a hose of structural integrity and acceptable appearance.

One of the major problems was obtaining the desired cleanliness levels. In order to eliminate cleaning as a final assembly, some of the components were supplied by sub-contractors, cleaned and packaged. This was particularly true of the hose because of the small diameter of the bore. Since talc was used in the manufacturing process, small quantities were observed on the finished sub-assembly. It was only by closest coordination with the venders that this problem was solved. Sierra and vendor personnel, through painstaking trial and error, were able to develop techniques which resulted in reducing these contaminents to an acceptable level.

Some problems existed in cleaning, on final assembly and packaging in the Clean Room at Sierra. Refinement of techniques and careful handling reduced this contamination. A problem of particles adhering to the surface by static charge still remained. This problem was finally brought under control by installing a static eliminator. This static eliminator uses radioactive material which is placed in a fan assembly. This ionizes the air and is distributed throughout the Clean Room or can be directed toward the parts. This eliminates static charge and makes particles easier to remove.

During the execution of this contract, an evaluation of Viton as a replacement for Silicone was undertaken by Sierra. Viton offers a higher degree of flame resistance. It was determined, however, that certain disadvantages made it impractical to present this material to NASA for evaluation.

The Viton is extremely difficult to mold with the intricate mold used to produce the facepiece; the scrap rate was so high that the cost would increase greatly. It was also observed that the Viton was so stiff that the desired faceseal was not attained. Further, the weight of the elastomer was approximately twice that of silicone. This evaluation was discontinued until a vastly improved material became available.

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Some experimental work was carried on attempting to develop a Viton coated silicone. This would improve the fire resistance of the assembly, although not to the extent of solid Viton. Again, the state-of-the-art has not advanced to a point where acceptable results were obtained. It did show some promise, but it was concluded that much more intensive research would be required to determine if this approach would produce a product improvement justifying the added cost.

Very truly yours,

SIERRA ENGINEERING CO.

/s/

Leo F. Hotz

/s/

Aaron Bloom, President

LFH:vg

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