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REPORT 7606



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A FLASH STERILIZER USING PERACETIC ACID

H. BRUCE CRANFORD, JR.

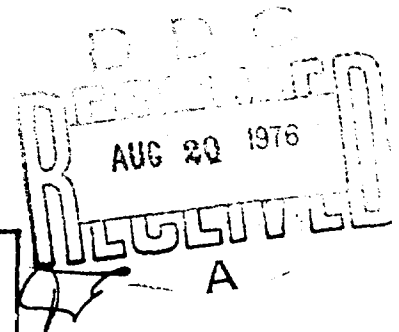
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| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br>Sterilizer<br>Peracetic Acid<br>Medical Equipment                                                                                                                                                                                                                                                                                                     |                                                                           |                                                                                                                                                                                       |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>A prototype sterilizer to be used in a Military Field Environment Operating Room area whereby an accidentally contaminated instrument can be rapidly reesterilized using peracetic acid and returned to use was designed and partially fabricated. The task was terminated when commercial equipment became available to perform the desired function. |                                                                           |                                                                                                                                                                                       |

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## INTRODUCTION

Background. A need existed to develop a sterilizer for use in an operating area whereby an accidentally contaminated instrument can be rapidly re-sterilized and returned to use in a Military Field Treatment Area (i.e., Combat Support Hospital).

Initially, the task started as an In-House Laboratory Independent Research Project at the U.S. Army Medical Bioengineering Research and Development Laboratory (USAMBRDL) Fort Detrick, Frederick, Maryland, on 29 November 1974. The U.S. Army Medical Research and Development Command (USAMRDC), Washington, D.C., established the Task "Flash Sterilization Using Peracetic Acid", Work Unit No. 3A162110A810.08.003 at USAMBRDL, (Appendix A). USAMRDC terminated the task at USAMBRDL on 4 December 1975, (Appendix B).

Objective. The objective was to develop a means and necessary sterilization equipment to provide for effective, rapid flash sterilization of surgical instruments and devices using Peracetic Acid ( $\text{CH}_3\text{CO}_2\text{OH}$ ).

Approach. The approach was to: (a) conduct a Literature Search to determine physical and chemical properties of Peracetic Acid; (b) develop a tentative technique for using the sterilization properties in the anticipated environment; (c) design and build a prototype sterilizer; and (d) test the equipment. The Peracetic Acid Consultant was Dr. C. R. Phillips. The Project Offices/Nursing Consultants were LTC M. Wisler and LTC D. McLeod of USAMRDC.

## STATUS

Properties of Peracetic Acid. Peracetic Acid is a colorless liquid at room temperature. It is normally shipped in 40% solution with the typical composition in Table 1.

TABLE 1  
COMPOSITION % BY WEIGHT

|                                                  |       |
|--------------------------------------------------|-------|
| Peracetic Acid $\text{CH}_3\text{CO}_2\text{OH}$ | 41.3% |
| Hydrogen Peroxide $\text{H}_2\text{O}_2$         | 5.1%  |
| Acetic Acid $\text{CH}_3\text{COOH}$             | 39.3% |
| Sulfuric Acid $\text{H}_2\text{SO}_4$            | 1.0%  |
| Water (Free)                                     | 13.3% |

It has a pungent odor, the vapors being flammable (flash point 40°C) and are lachrymatory. Microbiological tests show Peracetic Acid to be a highly efficient bactericide and fungicide even at concentrations of less than 1%. Peracetic Acid solutions 40% have a pronounced corrosive effect on human skin.

Additional chemical and physical properties are contained in the references. A partial list of compatible, noncompatible, and catalytic materials are shown in Tables 2, 3, and 4.

As an additional guide, Dr. Phillips advised that material compatible with Hypochloride would be compatible with Peracetic Acid. Mr. MacKellar (Reference 19) indicated items that catalyzed  $H_2O_2$  or had organic double bond, would be attacked by Peracetic Acid.

Peracetic Acid literature searches of the following data banks were conducted:

- a. Defense Documentation Center (DDC), report bibliography and research and development planning summary.
- b. National Aeronautics and Space Administration (NASA).
- c. National Technical Information Service (NTIS).
- d. Science Information Exchange (SIE).
- e. National Library of Medicine (MEDLARS).

Applicable references were reviewed and are listed in the Bibliography.

Proposed Design Approach. The design approach was to provide a sterilizer in the form of a sterile chamber in which peracetic acid is employed as the sterilizing agent. The system would be used as follows (Reference 8):

- a. A gloved individual insert the clean instrument requiring sterilizing into the chamber.
- b. The instrument is scrubbed with peracetic acid by means of a sponge, gauze pad, etc.
- c. The instrument is wiped dry by means of a sterile towel, aided by a warm filtered air stream.
- d. The instrument is removed, wrapped if necessary in the towel used for wiping, available for immediate use or temporary storage.

TABLE 2  
COMPATIBLE MATERIAL/PERACETIC ACID

| <u>Item</u>           | <u>Material</u>                 | <u>Reference</u> |
|-----------------------|---------------------------------|------------------|
| <u>Metals</u>         |                                 |                  |
| 1.                    | AL 1060 or 5254                 | 10               |
| 2.                    | SS 816 or 347 (No Storage)      | 10               |
| 3.                    | SS 304 (No Storage)             | 6                |
| 4.                    | AL 2S Purity Min                | 6                |
| <u>Plastics</u>       |                                 |                  |
| 1.                    | Polyethylene                    | 10               |
| 2.                    | Polypropylene                   | 10               |
| 3.                    | KEL-F                           | 10               |
| 4.                    | Teflon                          | 10               |
| 5.                    | Polystyrene                     | 10               |
| 6.                    | Polyethylene Polyisobutylene    | 10               |
| 7.                    | Saran                           | 10               |
| 8.                    | GE Silicone #12650              | 38               |
| 9.                    | BUNA-N                          | 6                |
| 10.                   | Silicone Rubber Caulking (4% P) | 6                |
| <u>Other Material</u> |                                 |                  |
| 1.                    | Glass                           | 10               |
| 2.                    | Amber Glass                     | 10               |
| 3.                    | Kimax                           | 10               |
| 4.                    | Pyrex                           | 10               |
| 5.                    | Glazed Ceramic Tile             | 6                |
| 6.                    | Acid-Resistant Paint            | 6                |
| 7.                    | Wood (2%)                       | 16               |
| 8.                    | Rubber Floor Tile               | 16               |
| 9.                    | Paper                           | 16               |
| 10.                   | Cloth                           | 16               |
| 11.                   | Fiber Glass                     | 20               |
| 12.                   | Leather                         | 20               |

TABLE 3  
NONCOMPATIBLE MATERIAL/PERACETIC ACID

| <u>Item</u>            | <u>Material</u>                                           | <u>Reference</u> |
|------------------------|-----------------------------------------------------------|------------------|
| <u>Metals</u>          |                                                           |                  |
| 1.                     | AL (Not 1060 or 5254)                                     | 10               |
| 2.                     | Iron, Black and Galvanized                                | 37               |
| 3.                     | Zinc                                                      | 37               |
| 4.                     | Mercury                                                   | 37               |
| <u>Plastics</u>        |                                                           |                  |
| 1.                     | Various Vinyl Formulations (40%) (May be used for gasket) | 10               |
| 2.                     | Koroseal (40% P) " " " " "                                | 10               |
| 3.                     | Vinylite (40% P) " " " " "                                | 10               |
| 4.                     | Tygon (40% P) " " " " "                                   | 10               |
| 5.                     | Natural Rubbers                                           | 10               |
| 6.                     | Synthetic Rubbers                                         | 10               |
| 7.                     | Some Silicons                                             | 10, 37           |
| 8.                     | Plexi Glass (40% Peracetic Acid)                          | 38               |
| <u>Other Materials</u> |                                                           |                  |
| 1.                     | Organic Sulfur Compounds                                  | 37               |
| 2.                     | Organic Nitrogen Compounds                                | 37               |
| 3.                     | Aromatic Nitroso Compounds                                | 37               |
| 4.                     | Concrete                                                  | 6                |
| 5.                     | Mortar                                                    | 6                |



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TABLE 4  
CATALYSTS/PERACETIC ACID

| <u>Item</u>         | <u>Material</u> | <u>Reference</u> |
|---------------------|-----------------|------------------|
| 1. Iron             |                 | 37               |
| 2. Cobalt           |                 | 37               |
| 3. Copper           |                 | 37               |
| 4. Manganese        |                 | 37               |
| 5. Lead             |                 | 37               |
| 6. Mercury          |                 | 37               |
| 7. Dirt             |                 | 37               |
| 8. Dust             |                 | 16               |
| 9. Stainless Steel  |                 | 16               |
| 10. Galvanized Iron |                 | 38               |
| 11. Platinum        |                 | 36               |
| 12. Charcoal        |                 |                  |

The peracetic acid immediately sterilizes both the instrument and the gloved hands of the operator. The device is available for immediate use, since the instrument will be essentially at room temperature and there are no residues to eliminate.

The sterilizer is to be a table top model and its chamber provided with a sloped observation window so that the operator has an unobstructed view of the chamber contents at all times. The size of the unit is such that it can be employed within the MUST operating room, where space is at a premium. Access to the chamber is by means of a full-size opening, whereby as soon as the door is opened there is generated a vertical laminar filtered air curtain so as to isolate the chamber containing the peracetic acid, from the operating room.

The interior of the chamber contains a stainless steel tray filled with a 2% solution of peracetic acid. This concentration is judged to provide adequate concentration of peracetic acid for a 24 hour operation. The peracetic acid concentration should not go below 1% during this period, a concentration adequate for sterilization. It is planned that a unit-dose package would be provided so that when contents are placed in a tray and the tray filled with water, a 2% solution will result. The preparation of peracetic sterilizing agent will be replaced each morning prior to start of surgery. The interior of the chamber will also be provided with a sponge, a supply of sterile towels, and an air outlet providing a stream of filtered warm air as an aid to drying. All traces of liquid peracetic acid must be removed from the instrument prior to removal of instrument from the chamber.

The electrical power requirements for the unit are expected to be very low and available from a standard electrical convenient outlet. Power will be required to operate an air blower which will push air through a biological filter (capable of producing sterile air) through a perforated manifold to produce the air curtain, through a vent which can either:

- a. Be provided with a canister containing an absorbent material;
- b. Or directly ducted outside of the operating room.

A secondary amount of filtered air will be warmed and supplied to the chamber interior to expedite wiping and drying of the sterile instrument. The design will have to consider:

- a. Use of electrical devices in operating room. Either the blower unit will have to be located outside of the operating room (which will also minimize noise level of blower), above the five foot explosive gas level, or must meet Group 1, Class C environmental requirements, and;
- b. Minimum level of noise acceptable within an operating room.

The method described above is favored over a process involving placing of instrument in a perforated container, and dipping it into peracetic acid, and drying of instrument while still in the container. This latter method will require larger trays, accessory perforated containers, larger chamber, more air and power requirements. It will only be considered in the event that the proposed method does not meet with the approval of the professional medical evaluators.

Equipment. The current design is a cabinet, Figure 1, constructed of 1/2" Plexiglass and assembled with screw. The cabinet is 30 inches high, 28 inches wide and 18 inches deep. The front of the cabinet has two corrosion resistant steel glove ports and a hinged top access door. The glove ports are sealed using GORE-TEX<sup>(P)</sup>(1), joint sealant, 1/8" in diameter.

The intended use of the gloves is to protect the operator from peracetic acid while sterilizing the tools.

The top access door is constructed from 1/2" plexiglass and hinged at the top. The door opens out from the cabinet. A counter weight is attached to the left side in order to reduce the opening effort. The door can be opened with the hand or foot using the foot lever. The lever is attached to the counter weight by a rope going through a series of pulleys. The position of the counter weight and rope attachment point can be varied for test purposes. The door can be locked closed by a top latch. The door is sealed by Frost-King Self Stick closed cell vinyl foam tape, 1/8 inches thick, 1/4 inches wide. Non-sterile tools are introduced into and sterile tools removed from the sterilizer through the top access door.

A second door called a side access door, is installed on the right hand side of the cabinet. It is constructed from 1/2" plexiglass, can be opened or closed manually and locked in the closed position. The tray containing peracetic acid is placed into the cabinet through this door. Placement of the tray via the top door would increase the chance of spillage. The side door, in addition, aids in cleaning and maintenance of the cabinet.

Inside the cabinet is a false bottom of two removable aluminum trays. This raises the bottom of the cabinet to the same height as the lower edge of the side access door. The purpose being to prevent spillage of the peracetic acid and aid in cleaning and maintenance.

Attached to the inside back of the cabinet is a long row of corrosion resistant steel hooks. The hook assembly is attached to the cabinet wall with screws. The hooks are for placement of surgical tools when inside the cabinet.

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(1) Local distributor, W. L. Gore and Associates, Inc., Box 513, Route No. 5, Elkton, Maryland 21921

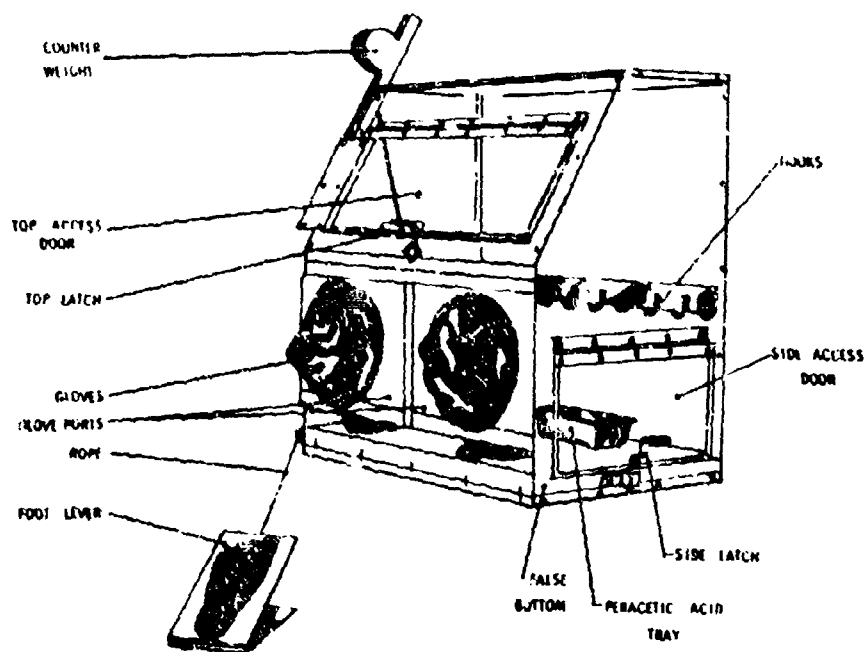


FIGURE 1. FLASH STERILIZER

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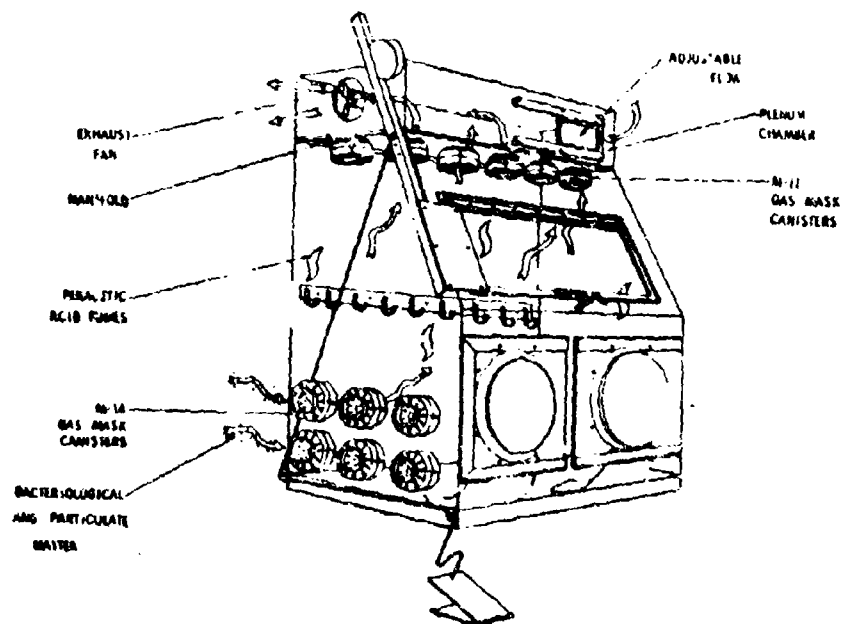


FIGURE 2. FLASH STERILIZED (PROD. CELL)

D10 09 022 - 2

LTC M. Wisler of USAMRLC reviewed SC6545-B-CL-D28, 1 partment of the Army Medical Equipment Set, Clearing Station (National Stock Number 6545-00-457-6859) (Line Item Number M23471) and SC 6545-8-CL-D27 Medical Equipment Set Battalion Aid Station (National Stock No. 6545-00-457-6358) (Line Item Number M23218) for a representative list of surgical tool. The materials were ordered (Table 5) to determine materials compatibility with peracetic acid, and for use in functional test of the flash sterilizer.

At this point in time, the task was terminated (Appendix B) because commercial equipment became available to perform desired function. The cabinet was not complete at this stage of development. It had been planned to incorporate an air flow system, Figure 2, to prevent acetic and peracetic acid fumes from entering the operating theater. Air was to be drawn into the bottom of the cabinet through six each M-14 Canisters, MIL-C-10082, and exhausted through six each M-11 Canisters, MIL-C-10116, at the top of the cabinet. The canisters were to be screwed onto manifolds for easy replacement. The manifolds were to be attached with screws to the plexiglass and sealed to prevent leakage.

The exhaust fan would be located in the plenum chamber at the top of the cabinet. Bacteriological and particulate matter would be removed from the intake air by the M-14 canister. The acetic and peracetic acid fumes would be removed from the exhaust air by the M-11 canister. The plenum chamber was to have an adjustable opening to control the air flow through the chamber.

An ON-OFF switch would control the exhaust fan. Two fans were available for test: (a) Muffin Fan 34 Watts 105/125 V 60 AC (2373) and; (b) An Axial Fan, AMP, 120 V, AC 120 cfm. At one point in time a Barney-Chaney activated charcoal canister, Air Purifier, Series C, Model CHA 8" x 25", 1 AMP, 120 cfm 120 V, 60 Hz, was considered and ordered for the air purification system. It was suggested by Dr. Phillips to use standard canisters (i.e., M-11 and M-14) in lieu of the Barney-Chaney equipment.

A hot air gun was considered to dry the surgical tools, but further investigation was needed to determine the most desirable type. It must be remembered that at certain concentrations, peracetic acid fumes are flammable. Also, the unit was intended to be used in an operating room which may require a hot air gun to meet explosion proof criteria.

The following additional areas of investigation have not been completed:

- a. The type of trays to hold the peracetic acid.
- b. The optimum number and types of gas canisters, since the entire field was not examined.

TABLE 5  
SURGICAL INSTRUMENTS FOR FLASH STERILIZER  
TASK NO. 816.08.053

| ITEM | DATE<br>ORDERED | DATE<br>RECEIVED | QUANTITY | UNIT<br>COSTS | FSN           | ITEM                     |
|------|-----------------|------------------|----------|---------------|---------------|--------------------------|
| 1    |                 |                  | 4        | \$ .60        | 6515-299-8356 | CATH URET RNO TIP 16 FR  |
| 2    |                 |                  | 2        | 6.37          | 8737          | HOLDER SUT NOL H M 71R   |
| 3    |                 |                  | 1        | 12.50         | 6515-312-4125 | BUR CRAN HUDS 14 MM      |
| 4    |                 |                  | 1        | 12.30         | 4130          | BUR CRAN HUDS 20 MM      |
| 5    |                 |                  | 1        | 34.80         | 5320          | BRONCH JACK 8 MM x 40 CM |
| 6    |                 |                  | 1        | 32.20         | 6515-320-3800 | CLAMP PYLORUS PAYR 81    |
| 7    |                 |                  | 4        | 3.52          | 4600          | FORCEPS TOWEL BACK 51    |
| 8    |                 |                  | 1        | 4.82          | 321-0680      | CABLE ASS ELECT BOEHM    |
| 9    |                 |                  | 1        | 2.39          | 327-8400      | ELEVATOR PERIO SAYR      |
| 10   |                 |                  | 1        | 5.12          | 328-0700      | ELEVATOR PERIO 73-4IN    |
| 11   |                 |                  | 1        | 19.00         | 331-1300      | FORCEPS BONCUT CV 101    |
| 12   |                 |                  | 1        | 18.90         | 4600          | FORGEUR CUR HARTM 71     |
| 13   |                 |                  | 1        | 45.10         | 4800          | FORGEUR CUR STILLE       |
| 14   |                 |                  | 2        | 1.19          | 333-3600      | FORCEPS DRES ST 51-21    |
| 15   |                 |                  | 2        | 10.50         | 334-1400      | FORCEPS GAL DUC CV 77    |
| 16   |                 |                  | 4        | 4.81          | 4300          | FORCEPS HEM C. ROCH P61  |
| 17   |                 |                  | 4        | 3.52          | 4900          | FORCEPS HEM CV HAL 51    |
| 18   |                 |                  | 4        | 4.28          | 5600          | FORCEPS HEM ST HAL 51    |
| 19   |                 |                  | 4        | 3.42          | 6800          | FORCEPS HEM ST KEL 51    |
| 20   |                 |                  | 2        | 6.97          | 7500          | FORCEPS HEM ROCH 071     |
| 21   |                 |                  | 2        | 10.00         | 335-2800      | FORCEPS INT ST BAB 61    |
| 22   |                 |                  | 2        | 6.95          | 337-3900      | FORCEPS PAD HLD ST 9 1   |
| 23   |                 |                  | 2        | 1.23          | 9900          | FORCEPS TIS STR 5 IN     |
| 24   |                 |                  | 1        | 6.10          | 341-5800      | HOLDER NEED MASS 10 1    |
| 25   |                 |                  | 1        | 2.20          | 342-2300      | HOOK DURA ADSON 8 IN     |
| 26   |                 |                  | 2        | .78           | 344-7800      | HANDLE SURG KNIFE NO     |
| 27   |                 |                  | 2        | 1.04          | 356-7100      | PROB BULLET              |
| 28   |                 |                  | 1        | 8.73          | 360-3490      | RETRACT ABD 12 IN 1-IN   |
| 29   |                 |                  | 1        | 9.15          | 3510          | RETRACT ABD 12 IN 1-IN   |

TABLE 5 (Continued):

| ITEM | DATE<br>ORDERED | DATE<br>RECEIVED | QUANTITY | UNIT<br>COSTS | FSN           | ITEM                   |
|------|-----------------|------------------|----------|---------------|---------------|------------------------|
| 30   |                 |                  | 1        | \$ 8.51       | 6515-360-3850 | RETRACT ABD DBLE END   |
| 31   |                 |                  | 2        | 3.45          | 4100          | RETRACT ABD 10 2x21-2  |
| 32   |                 |                  | 2        | 3.32          | 7400          | RETRACT BRAIN 8 INC    |
| 33   |                 |                  | 2        | 4.96          | 9200          | RETRACT GEN OPER SE 2  |
| 34   |                 |                  | 2        | 6.80          | 361-0350      | RETRACT GEN OPER 4 PR  |
| 35   |                 |                  | 1        | 17.50         | 3950          | RETRACT MAST TENSEN    |
| 36   |                 |                  | 2        | 3.12          | 8950          | RETRACT TRACH 1 SHPPRG |
| 37   |                 |                  | 2        | 6.32          | 8980          | RETRACT TRACH 3 SHPPRG |
| 38   |                 |                  | 2        | 3.79          | 362-0200      | RETRACT VEIN CUSHIN    |
| 39   |                 |                  | 2        | 6.80          | 363-1100      | SAW AMPUT 8 IN BLADE   |
| 40   |                 |                  | 2        | 2.94          | 8840          | SCISS BAND ANG 7 1/4   |
| 41   |                 |                  | 2        | 2.47          | 364-0520      | SCISS GEN SURG 5       |
| 42   |                 |                  | 2        | 3.58          | 365-1820      | SCISS GEN SURG ST 5-1  |
| 43   |                 |                  | 1        | 4.41          | 374-6900      | ELEV PERIO MATS 8 3/4  |
| 44   |                 |                  | 1        | .76           | 375-1100      | STYLET CATH MALL ST    |
| 45   |                 |                  | 1        | 3.05          | 384-5100      | CANNULA BRON ESOPH 50C |
| 46   |                 |                  | 1        | 8.46          | 518-5475      | CANN TRAC MOD JACK S26 |
| 47   |                 |                  | 1        | 9.79          | 5478          | CANN TRAC MOD JACK 7W  |
| 48   |                 |                  | 6        | .23           | 660-0046      | AIRWAY PLASTIC AD-CHI  |
| 49   |                 |                  | 1        | 7.16          | 914-0244      | CANNULA TRACHE NYL S2  |
| 50   |                 |                  | 1        | 15.60         | 926-9193      | RETRACT MAST WEIT BLP  |
| 51   |                 |                  | 2        | 1.40          | 6530-770-9220 | BASIN EMESIS C-R STEEL |
| 52   |                 |                  | 6        | .04           | 780-7000      | MEDICINE GLASS 1 OZ    |
| 53   |                 |                  | 2        | .32           | 7920-772-5935 | BRUSH SURG             |

c. Optimum air flow necessary to prevent escape of peracetic acid fumes.

d. Procedures for use of the equipment.

e. Effectiveness of the sterilizing procedures as used with the equipment.

f. Compatability of surgical materials with peracetic acid.

Upon completion of fabrication, the unit was to be subjected to Development Test I and Operational Test I, per AR 70-1.



## SUMMARY

When the task was terminated the Literature search was nearly completed and fabrication had started on the Development Test I prototype. The following areas of investigation remained to be completed:

- a. Selection of a hot air gun that will dry the equipment and be compatible with the environment.
- b. Surgical instrument materials compatibility with peracetic acid.
- c. Type of trays to hold the peracetic acid.
- d. The optimum number and types of gas canisters for air filtration and purification since the entire field was not thoroughly examined.
- e. Optimum air flow necessary to prevent escape of peracetic and acetic acid.
- f. Procedures for use of the equipment.
- g. Effectiveness of the sterilizing procedures as used with the unit.

## BIBLIOGRAPHY

1. AR 70-1, "Army Research and Development".
2. Borick, P. M., "Chemical Sterilization, Benchmark Papers in Microbiology", Dowden, Hutchinson and Ross, Inc., Stroudsburg, PA, 1973.
3. Decker, H. M., "The Need for Biological Decontamination of Field Shelters, Occupants, and Methods of Control: A Review of Contractual Literature", Technical Memorandum 95, U.S. Army Biological Center, Fort Detrick, Frederick, Maryland, June 1966.
4. Defense Documentation Center, "Report Bibliography on Peracetic Acid", 23 December 1974.
5. Defense Documentation Center, Research and Development Planning Summary, 26 December 1974.
6. Delorme, R., "Design, Operation and Limitations of a Peracetic Acid Shower", Technical Manuscript 424, Fort Detrick, Frederick, Maryland, October 1967, DNC AD 663913.
7. Department of the Army Supply Bulletin, SB 740-94-120, "Mask, Protective, (All Types) and Ancillary Items".
8. Disposition Form, U.S. Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, Frederick, Maryland 21701, SGRD-UBE, 7 December 1972, Subject: Proposed ILIR Mask - Title: Flash Sterilization.
9. Dorok, H. H. and Malzer, B., "Problem of Aseptic and Antiseptic Procedures at a Field Unit Pressing Station", Zeitschrift fur Milchemodizin, No. 3, pp 175-178, DNC AD 911299, 3 January 1973.
10. FMC Chemicals, Technical Data Bulletin #4, "Peracetic Acid 40%", FMC Chemicals, Inorganic Chemicals Division, 663 Third Avenue, New York, 1972.
11. Greenspan, F. P., et al, Patent 2,527,546, "Production of Fused Colours", 12 February 1948.
12. Greenspan, F. P., Patent 2,661,360, "Method of Making Mercuric Acetate", 30 January 1952.
13. Greenspan, F. P., et al, Patent 2,663,621, "Stabilization of Peroxid", 7 February 1952.

14. Jones, L. A., et al, "Sporicidal Activity of Peracetic Acid and  $\beta$ -Propiolactone at Subzero Temperatures", Applied Microbiology, pp 357-362, American Society of Microbiology, Vol. 15, No. 2, AD 651442, March 1967.
15. Kirk-Othmer, "Encyclopedia of Chemical Technology", Interscience Encyclopedia, Inc., New York, 1965.
16. Kline, L. B., et al, "The Virucidal Properties of Peracetic Acid", American Journal of Clinical Pathology, Vol. 33, No. 1, pp 30-33, January 1960.
17. Kretzschmar, et al, "Peracetic Acid Only a New Disinfectant," Monatsh, Vet Med 27 (9), pp 324-32, 1 May 1972.
18. Lawrence, C. A., et al, "Disinfection, Sterilization, and Preservation", Lee and Febiger, Philadelphia, PA, 1962.
19. Mackellar, FMC Corporation, Princeton, New Jersey, TELCON, 7 January 1975.
20. Makowski, J., et al, "Collective-Protection Against CB Agents", CB 1006, Vol. 1, Progress Report, 1 May 1965, AD 473535, 30 June 1965.
21. Memorandum for Record, U.S. Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, Frederick, Maryland 21701, SGRD-UBE-G, 14 August 1973, Subject: Field Sterilization, Medical, Surgical Supplies and Equipment - Flash Sterilization Using Peracetic Acid.
22. Merka, V., "Hand Disinfection With Performic Acid", Zentralbl Bakteriol. Hyg I Abt Org (B) pp 156, 441-445, From NLM, 1972.
23. MIL-C-10082, Military Specification, "Canister, Particulate, M-14".
24. MIL-C-10116, Military Specification, "Canister, M-11".
25. National Aeronautic and Space Administration, Literature Search, 31 December 1974.
26. National Library of Medicine, Toxline, Search, Medline, 23 December 1974.
27. National Technical Information Service, Peracetic Acid Search, January 27, 1975.
28. Pazdova, A., "Hand Disinfection With Peracetic Acid", Zentralbl Bakteriol. (Org B) 155 (4) 420-3, February 1972.

29. Perry, H., et al, "Chemical Engineers Handbook", McGraw Hill, New York, 1973.
30. Phillips, C. R., "Gaseous Sterilization", DDC, AD 671373.
31. Portner, D. M., et al, "Sporicidal Effect of Peracetic Acid Vapor", Applied Microbiology, pp 1782-1785, Vol. 16, No. 11, November 1968.
32. Reddish, G. F., "Antiseptics, Disinfectants, Fungicides, and Sterilization", Second Ed, Lea and Febiger, 1957.
33. Sax, N. I., "Dangerous Properties of Industrial Materials", Van Nostrand Reinhold, Third Edition, New York, 1968.
34. Science Information Exchange, January 16, 1974.
35. Sprossig, M., et al, "Experiments and Observation on Sterilization of Thermobile Objects with Peracetic Acid", NASA Technical Translation, NASA TT-F-15, 522, May 1974.
36. Stark, D. C., "Sterilization by Chemical Agents", Int Anesthesiol Clinic 10 (2), 49-65, Summer 1972.
37. Sturgill, R. A., et al, "Methods and Material for Personnel and Equipment Decontamination", Final Report for Task #24 on Collective Protection Against CP Agents, Book 1, Unclassified, AD 883442.
38. Viessman, W., "Control of Odors in Working and Industrial Environments", Air Engineering, pp 18-26, December 1955.

## APPENDICES

SGRD-SOM

29 NOV 1974

SUBJECT: Request to Initiate Project in The Military Medical Materiel Program

Commander  
US Army Medical Bioengineering  
Research and Development Laboratory  
Fort Detrick  
Frederick, MD 21701

1. Reference 1st Ind, SGRD-SOM, 13 July 1974 to letter SGRD-URB, 19 June 1974, subject: Request to Include Projects in the Military Medical Materiel Program.

2. It has been determined that the In-House Laboratory, Independent Research Project, Flash Sterilization Using Peracetic Acid, terminated per referenced correspondence, should be initiated in the Military Medical Materiel Program, as part of the Field Sterilization Study.

3. Your contributing work unit number should be 3A16722CAE1A.08.053. Work on this facet of the Field Sterilization Project should begin at your earliest convenience. Monitor at this Headquarters is LTC Maria G. Wisler, AMC, Materiel Development Division, Surgical Research Directorate.

Signed  
R. E. B.

KENNETH R. FIRKS, M.D.  
Brigadier General, MC  
Commanding

RICHARD F. BARQUIST, M.D.  
Colonel, MC  
Deputy Commander, USAMRDC



DEPARTMENT OF THE ARMY  
U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND  
WASHINGTON, D.C. 20314

REPLY TO  
ATTENTION OF:

SGRD-SDM

4 December 1975

SUBJECT: Request to Terminate Project in Military Medical Materiel Program

Commander  
US Army Medical Bioengineering Research  
and Development Laboratory  
ATTN: SGRD-UBE-G  
Fort Detrick  
Frederick, Maryland 21701

1. Reference conference on project priorities, 2 December 1975, with US Army Medical Bioengineering Research and Development Laboratory (USAMBRDL) personnel determined that work unit number 3A162110A816.08.022 should be terminated.
2. The state-of-the-art does not dictate that the project, Flash Sterilization Using Peracetic Acid, be continued at this time.
3. Request a Final Report be prepared and distribution made in accordance with established requirement. Further request the prototype fabricated be kept at USAMBRDL for historical purposes.

FOR THE COMMANDER:

  
WALTER L. SCHEETZ, M.D.  
Colonel, MC  
Director of Surgical Research

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