BELLCOMM, INC.

SUBJECT: Nonmetallic Materials Program Status - Case 330

DATE: July 11, 1967

FROM: J. A. Saxton, Jr.

MEMORANDUM FOR FILE

The attached briefing charts were presented at the Apollo Program Office Review on July 5. The talk consisted of a brief description of the overall MSC materials control program and the present status of activity in this area. To summarize; the main problems have been identified through materials reviews conducted at the contractor's facilities; the major effort at this time is the search for acceptable replacement materials in those instances where the present material is inadequate; concurrently preparations are being made for full-scale boiler-plate flammability tests to be conducted at MSC, starting in August for the LM and in the fall for the CSM.

J. A. Saxton, Jr. -T.L. Powers for

2031-JAS-dcs

Attachments
Briefing Charts

X67-71568

(ACCESSION NUMBER) (THRU)

(PAGES) (CODE)

(NASA CR OR TMX OR AD NUMBER) (CATEGORY)

FACILITY FORM 602(A)

(NASA-CR-154817) NONMETALLIC MATERIALS PROGRAM STATUS (Bellcomm, Inc.) 9 p

N79-72467

Unclas

00/18 12523

AUG 1977
RECEIVED
NASA STI FACILITY
INPUT BRANCH

NONMETALLIC MATERIALS CRITERIA

OBJECTIVE	MEANS
1. MINIMIZE IGNITION POSSIBILITIES	• MATERIALS SELECTION • MATERIALS PLACEMENT
2. RESTRICT FIRE VOLUME	• COMPARTMENTATION
3. CONTAIN STRUCTURAL STRESS	• LIMIT PRESSURE AND TEMPERATURE RISE
4. CREW PROTECTION—FIRE	• NONFLAMMABLE SUIT
5. CREW PROTECTION—FIRE EFFECTS	• INSULATIVE SUIT (HIGH TEMPERATURES • ISOLATED SUIT LOOP (TOXIC GASES)

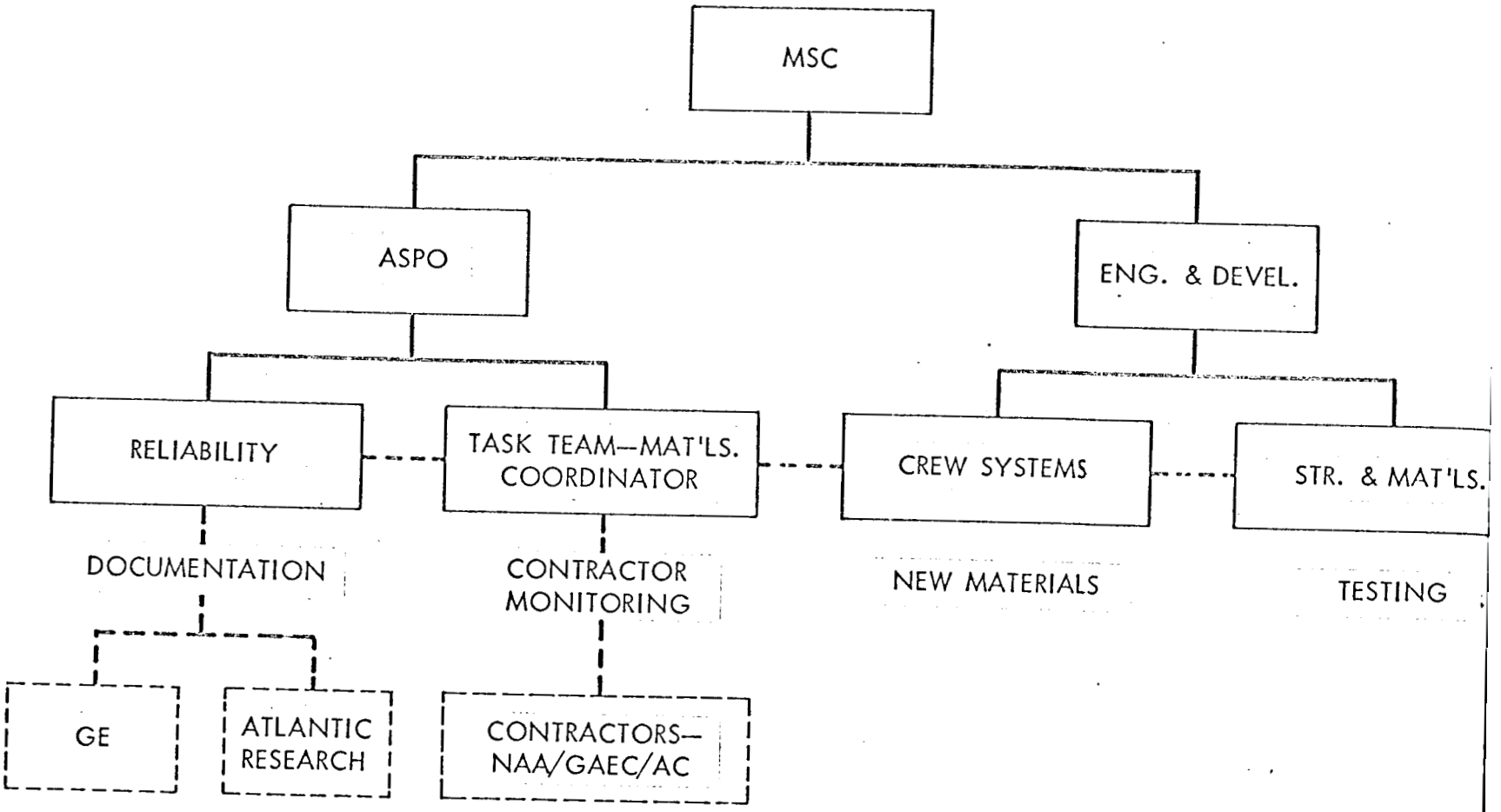
MATERIALS USAGE CATEGORIES

CATEGORY	USAGE	EXAMPLES	PRIME FLAMMABILITY CRITERIA
A	MAJOR EXPOSED	COUCH CUSHIONS, ELECTRICAL WIRING, POTTING COMPOUNDS	SELF EXTINGUISHING — 16.5 LB./SQ. IN. OXYGEN
B	MINOR EXPOSED AND SPECIAL USE	ELECTRICAL CONNECTORS & COMPONENTS, INSTRUMENT PANELS, BATTERIES	PROPAGATE <0.3 IN./SEC. NO DRIPPING OR SPARKING ΔP <2.5 LB./SQ. IN.
C	SUIT LOOP	HOSES, HELMETS, INNER GARMENT, COUPLINGS	SELF-EXTINGUISHING— 19.0 LB./SQ. IN. OXYGEN
D	HIGH-PRESSURE OXYGEN SYSTEM	FILTERS, VALVE SEATS, PRESSURE BLADDERS	FIRE POINT > 450°F (16.5) NO FRICTION OR IMPACT IGNITION
E	HERMETICALLY-SEALED CONTAINERS	ELECTRICAL WIRING, WIRE WRAPS, POTTING	NO CONTAINER RUPTURE FOR WORST CASE INTERNAL SHORT
F	VENTED CONTAINERS	FOAMS, FOOD PACKAGES, PRINTED CIRCUIT BOARDS	FIRE POINT > 450°F (16.5) VENT OVER PRESSURE WITHOUT FIRE PROPAGATION
G	NONFLIGHT	PLASTIC BAGS & TAPE, CARRY-ON GSE	SELF-EXTINGUISHING (AIR) "A" - "F" IN O_2 TESTING
H	OUTSIDE CREW BAY	INSULATION BLANKETS, WIRE BUNDLES, TAPE, CONFORMAL COATING	SELF-EXTINGUISHING (AIR)

MATERIALS TEST PROGRAM

- SAMPLE TESTS
  - PROPAGATION RATE
  - FLASH AND FIRE POINT
  - ODOR TESTS
  - CARBON MONOXIDE AND OFFGASSING
- COMPONENTS TESTS
  - ELECTRICAL WIRING AND INSULATION FLAMMABILITY
  - ELECTRICAL POTTING AND COATINGS FLAMMABILITY
  - INSIDE VENTED CONTAINERS
  - INSIDE HERMETICALLY SEALED CONTAINERS
- SIMULATED PANEL AND ASSEMBLY
- SIMULATED CREW BAY CONFIGURATION

MATERIALS ASSESSMENT ORGANIZATION



PROPOSED NEW MATERIALS

GENERIC NAME	PHYSICAL FORM	CHARACTERISTICS	USE
BETA CLOTH	3.8-MICRON GLASS FILAMENTS	NONFLAMMABLE MELTS AT 150°F o POOR ABRASION RESISTANCE	SUIT, HARNESSES, VELCRO, FILTERS
CARBOXY-NITROSO RUBBER (CNR)	FLUORINATED ELASTOMER	NONFLAMMABLE GOOD CHEMICAL, THERMAL, AND MECHANICAL PROPERTIES VAPORIZES AT 520°F HIGHLY TOXIC FUMES	ELECTRICAL SYSTEM OVERCOATING, FACE MASK
TEFLON	COMPLETELY FLUORINATED CARBON CHAINS	NONFLAMMABLE IN THICK SECTIONS CHEMICALLY INERT	HOSES, WIRE WRAPS
ASBESTOS	SILICON OXIDE	NONFLAMMABLE GOOD THERMAL INSULATION	SUIT INSULATION

MATERIALS PROGRAM STATUS

- MATERIALS REVIEWS — IDENTIFY PROBLEMS

  BLOCK II CSM DRAWINGS — DONE
  LUNAR MODULE DRAWINGS — DONE
  SM INSPECTION — DONE

- MATERIALS SAMPLE TESTING

  625 MATERIALS TESTED — ESSENTIALLY COMPLETE

- MATERIALS REPLACEMENTS

  NOT COMPLETE

- BOILER-PLATE TESTS

  8 CSM TESTS COMPLETED (FOUR WITH NEW MATERIALS)
  1 SET CSM TESTS PLANNED — BEFORE CSM MANNING
  1 SET LM TESTS PLANNED — BEFORE LM MANNING

CURRENT DECISION AREAS

	ITEM	ORIGINAL MATERIAL	TENTATIVE SUBSTITUTE
1.	ECU COOLANT INSULATION	SILICONE SPONGE	TG 15000 (CURED) COATED WITH CNR
2.	CREW RESTRAINT HARNESSES	NYLON	BETA CLOTH
3.	OXYGEN UMBILICAL AND COMM. CABLE	NYLON	SLIPCOVER - CNR/BETA
4.	SM THERMAL BLANKETS	MYLAR	H-FILM COAT
5.	POTTING COMPOUNDS	POLYURETHANE	CNR
6.	CIRCUIT BREAKERS AND TERMINAL BOARDS	EPOXY LAMINATE	CNR COAT

BELLCOMM, INC.

Subject: Nonmetallic Materials
Program Status - Case 330

From: J. A. Saxton, Jr.

Distribution List

Bellcomm

Messrs. F. G. Allen
A. P. Boysen, Jr.
D. R. Hagner
W. C. Hittinger
B. T. Howard
A. N. Kontaratos
J. Z. Menard
I. D. Nehama
G. T. Orrok
C. A. Pearse
I. M. Ross
R. L. Wagner

Department 2031
Department 1023
Central Files
Library