

SHUTTLE ORBITER

WASTE COLLECTOR SUBSYSTEM

NASA TIGER TEAM REVIEW

MAY 31, 1985

WASTE MANAGEMENT
SENSITIVITY ISSUES

- MICROBIAL SAFETY DURING OPERATION, SERVICING AND RETURN VIA NSTS
- SIMPLIFIED SANITIZING PROCEDURES
- NOXIOUS AND TOXIC GAS CONTROL
- EARTH-LIKE "USER FRIENDLY" OPERATION
- QUIET OPERATION
- MINIMAL SERVICING REQUIRED AND SIMPLIFIED STOWAGE TECHNIQUES
- LONG LIFE CAPABILITY, I.E. ENHANCED CORROSION PROTECTION
- SUSCEPTIBILITY TO MISUSE
- CREW TRAINING

OUR GOAL IS TO MAKE THE WCS EXPERIENCE AS EARTH-LIKE AS POSSIBLE; HOWEVER, THE FEATURES OF ZERO "G" OPERATION SUCH AS AIR FLOWS TO INDUCE GRAVITY EFFECTS AND RESTRAINT SYSTEMS ARE UNIQUELY REQUIRED IN SPACE AND NECESSITATE CREW FAMILIARIZATION TRAINING.

SHUTTLE ORBITER WCS
RECOMMENDED ENHANCEMENTS

- INCREASED SOLID WASTE STORAGE CAPACITY
- LARGER COMMODE¹ SEAT OPENING (NECESSITATES INCREASED AIR FLOW)
- CREW-CONTROLLED VARIABLE AIR FLOWS
 - 4 TO 20 SCFM URINAL
 - 20 TO 60 SCFM COMMODE } NOT SIMULTANEOUS
- CREW-CONTROLLED STOOL SEPARATION ASSIST
- IN-FLIGHT DEVICES FOR MONITORING OPERATION, I.E. AIR FLOW RATES
- CONTINUED NOISE REDUCTION

THE ONLY VIABLE DATA BASE FOR WASTE MANAGEMENT IS ACTUAL FLIGHT DATA, PRINCIPALLY FROM THE SHUTTLE ORBITER WCS. THIS IS BECAUSE OF THE VARIED ASTRONAUT POPULATION PRESENTLY USING THE WCS AND THE RELATIVELY SHORT TIME AVAILABLE FOR THE USER TO ADAPT TO THE UNIQUE WCS OPERATION IN THE ZERO "G" ENVIRONMENT.

STOOL SEPARATION ASSISTS

<u>ASSIST TECHNIQUE</u>	<u>REQUIREMENT</u>	<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
MORE AIR FLOW AIR JETS	ADD BOOSTER FAN PRESSURIZED GAS SOURCE	MINIMAL SYSTEM IMPACT ALSO USE FOR POSITION- ING	COOLING EFFECT IMPACT ON CABIN COMPOSITION
AIR BLAST	COMPRESSOR AND TANK	INSTANTANEOUS HIGH AIR FLOW	SMALL WEIGHT AND POWER INCREASE
BOUNCE SEAT	SPRING LOADED-MOTOR DRIVEN RAMP/STEP ACTUATED	LOW POWER POSITIVE "G"	INERTIAL EFFECT ON VEHICLE. BODY RESTRAINT DIFFICULT.
HYDRO JOHN	WATER JETS IN SEAT. BLENDER/SEPARATOR.	MINIMIZES NEED FOR TISSUE	USES 1 POUND OF WARM WATER. NEEDS WARM AIR DRYING.

DTO'S ARE RECOMMENDED FOR AT
 LEAST TWO OF THESE TECHNIQUES-
 FURTHER SELECTION ANALYSES
 REQUIRED.

OVERALL RECOMMENDATIONS

1. MAKE AVAILABLE A WCS FOR DEVELOPMENTAL TESTING OF NEW CONCEPTS.
2. DEVELOP AN ANIMATED TRAINING FILM SHOWING BEST OPERATIONAL PROCEDURES BASED ON CREW FLIGHT EXPERIENCE.
3. ESTABLISH A CONTRACTUAL MECHANISM TO SPEED NEW CONCEPT DEVELOPMENT AND PERMIT CLOSER WORKING RELATIONSHIP WITH ASTRONAUT REPRESENTATIVES.
4. FLIGHT TEST SEVERAL OPTIONS:
 - BAG STORAGE OF TISSUE - MANUALLY COMPACT - STOW IN COMMODE
 - TWO TYPES OF STOOL SEPARATION ASSIST DEVICES
 - INCREASED AND VARIABLE AIR FLOW
 - IN-FLIGHT MONITORING OF AIR FLOWS
 - SELF-CLEANING URINAL FILTER
 - LARGER SEAT OPENING

LET US NOT LOOK FOR A QUICK-FIX, BUT DEVELOP ENOUGH INFORMATION TO RECOGNIZE IT WHEN IT APPEARS.

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